MAY, 1933
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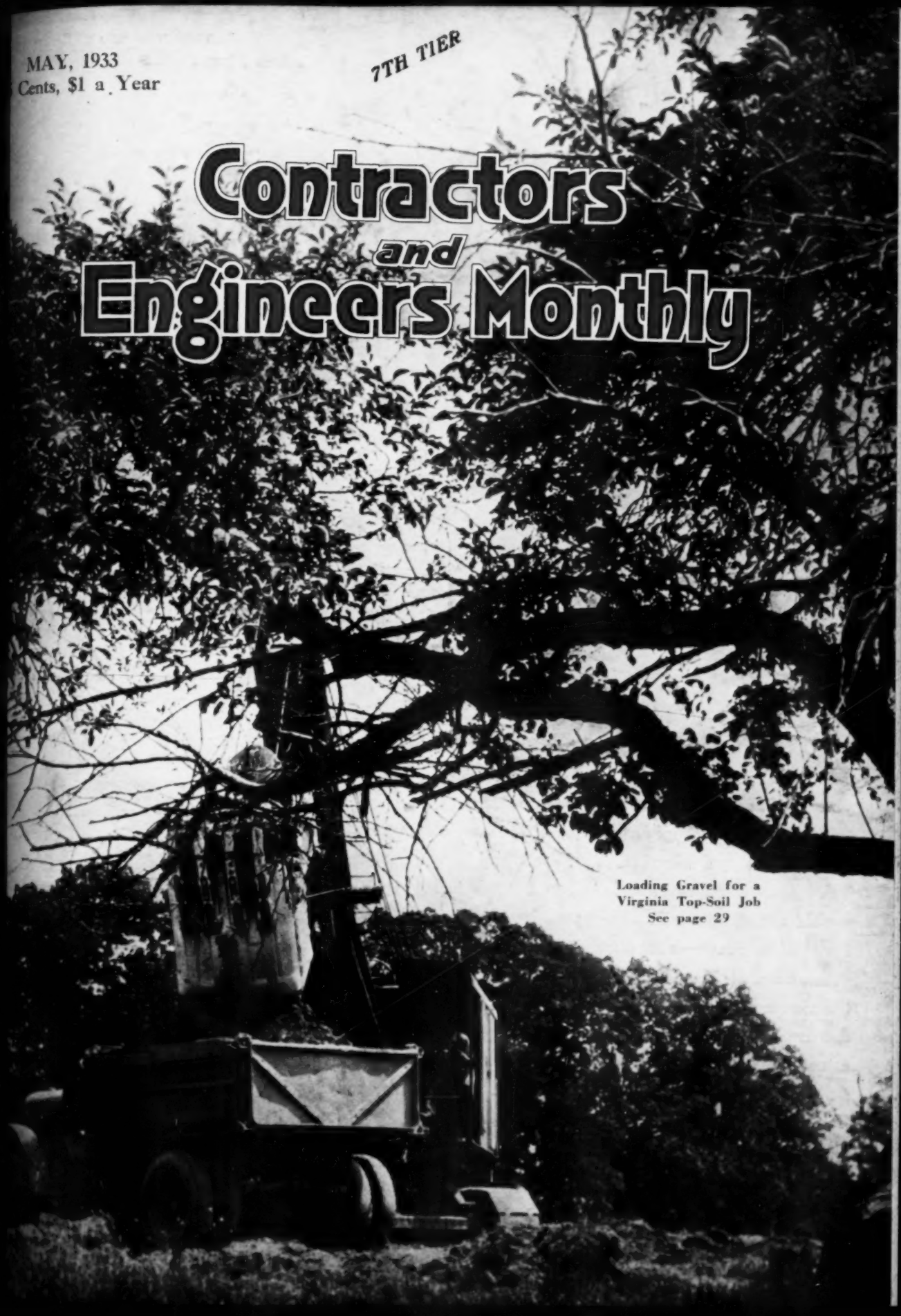
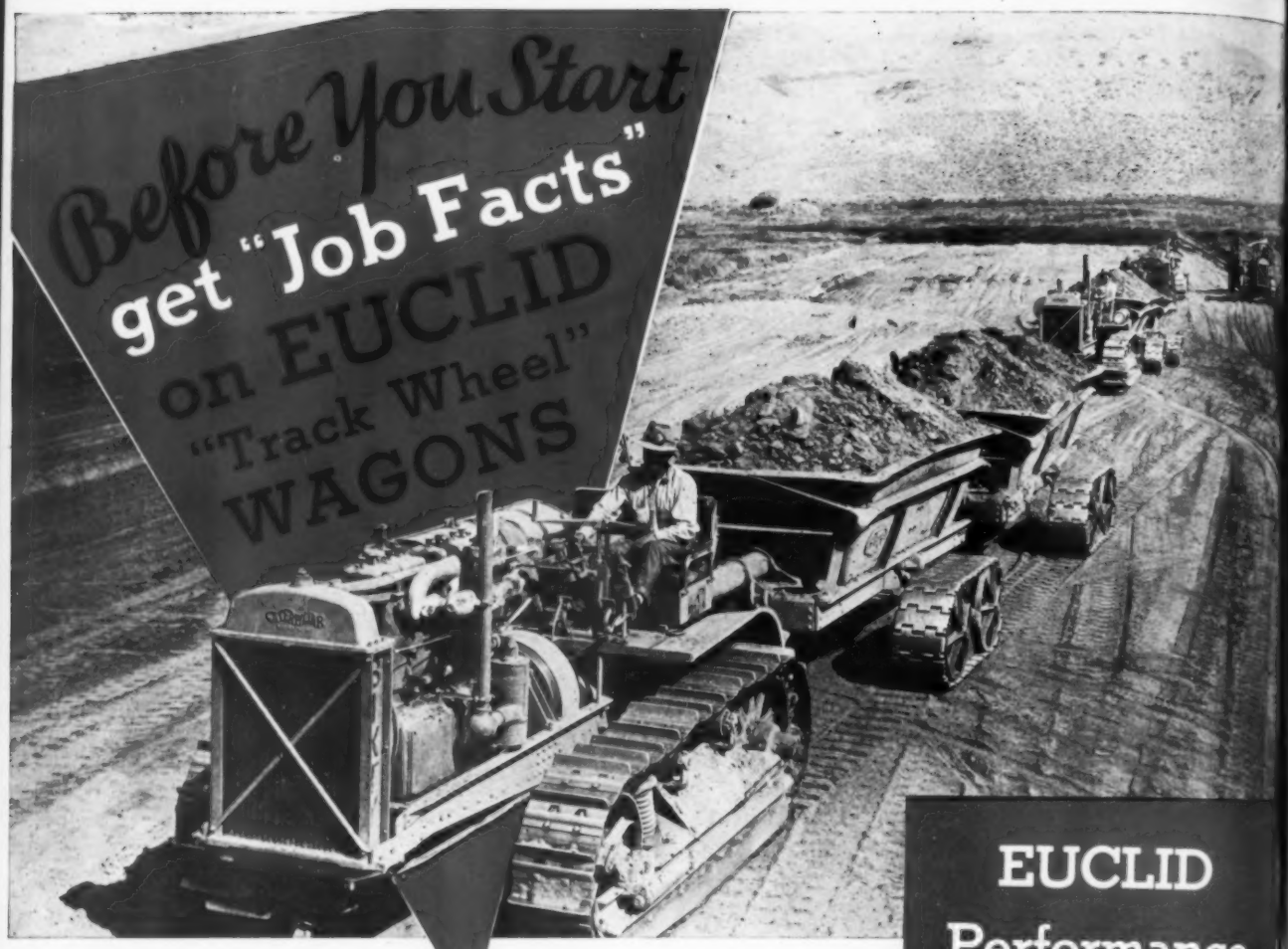
Contractors and Engineers Monthly



Loading Gravel for a Virginia Top-Soil Job
See page 29



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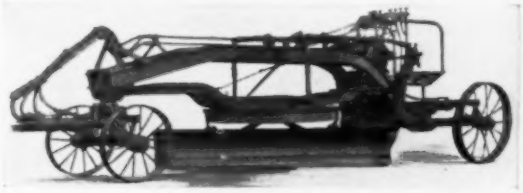

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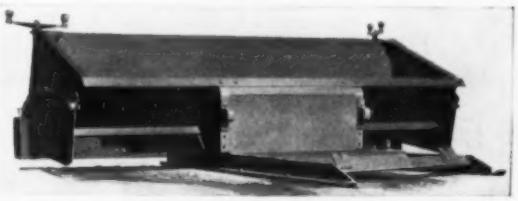

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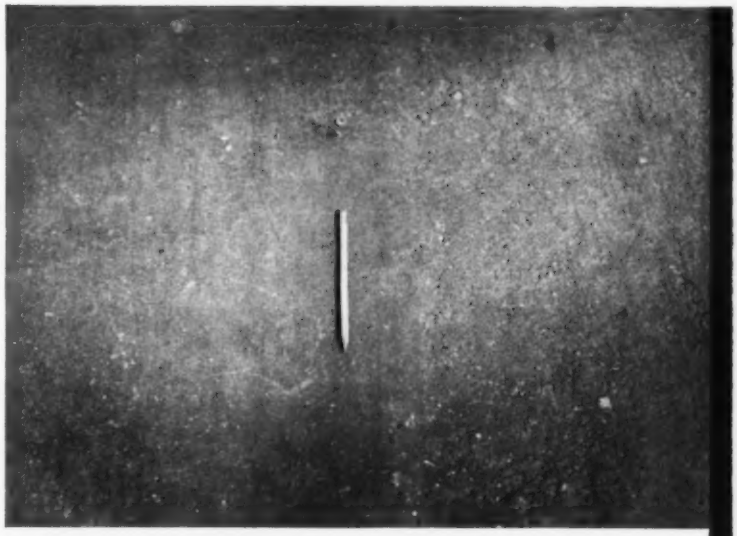

● **Close-up views of Stabilized Gravel Road, showing pencil impression on traveled way (above), taken one day and (below) seven days after maintenance. Note the surface durability evidenced by comparison of the impression.**

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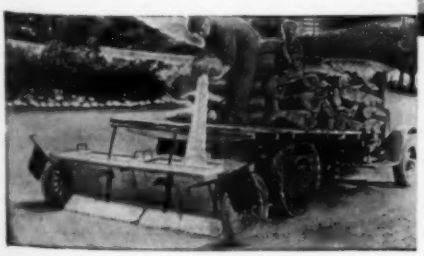

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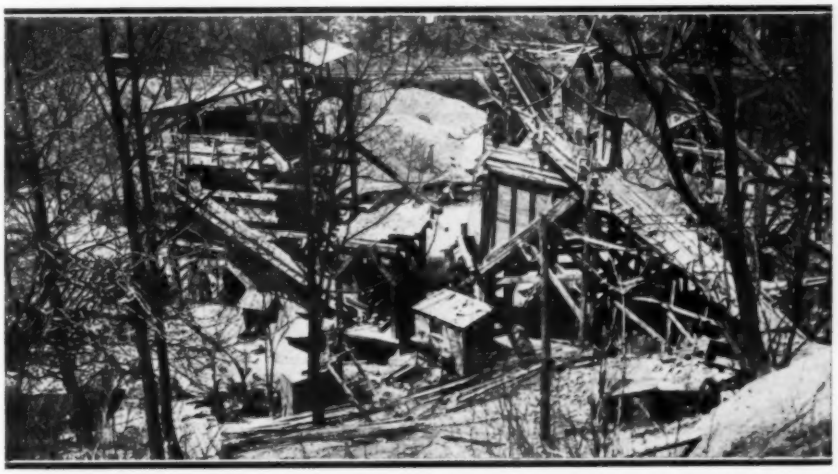
The Baltimore Water Tunnel *under* City Streets



The Stoney Run Shaft, at the Right, and the Contractor's Rock Crushing and Screening Plant for Aggregate

New Unit in Water System Built from Six Shafts

WORK was started early in 1931 on the new water tunnel in Baltimore from the Montebello filtration plant to the Vernon pumping station and Druid Lake, a distance of 13,294 feet. The object of this tunnel is to provide better pressures in the low pressure zone of distribution. The new tunnel, which lies from 84 to 125 feet below the street level, is constructed literally below the streets to eliminate the need for extensive and expensive litigation to secure the necessary rights of way through private property. About 85 per cent of the work was in rock and the remaining 15 per cent proved the real problem of the entire job for the contractor, a section of 1,464 feet of mud and water-bearing sand which defied timbering and liner plate tunnel construction. It was completed as a compressed air job.

The rock tunnel is lined with 84-inch Lock Joint reinforced concrete pressure pipe throughout. At the Montebello filters the concrete pipe hooks up with a 96-inch conduit which has been Gunited to a 92-inch conduit and at Vernon it connects with a 60-inch cast iron line which forms the suction for the pumps in the Vernon station. The tunnel runs approximately east and west but with several sharp curves in order to keep it under the public streets. The work was handled from six shafts known as Vernon shaft at the west end, then Stoney Run shaft, Charles Street shaft, Frisby Street shaft, Alemeda Street shaft and at the east end the Montebello shaft. A shaft intermediate to the last two named and known as Park Grove shaft in the soft section was abandoned.

Progress of Work

The work on the shafts was started March 15, 1931, and all shafts were completed September 2, 1931. Tunneling was started at Montebello shaft first on May 13, 1931, and the tunnel in rock was completed from all shafts on January 14, 1932. Concreting of the invert of the tunnel with the imbedded industrial railway tracks was completed on March 2, 1932, and the laying of pipe, except for the soft section, was finished May 31, 1932.

The contractor, Whiting-Turner Construction Co. of Baltimore, Md., varied the working hours according

to the major type of work under way. The work started off with two 12-hour shifts and then changed to two 10-hour shifts. Three 8-hour shifts were used for a while and then toward the end of the work they returned to the two 12-hour shifts. They worked a 6-day week with only necessary maintenance work on Sundays.

THE SHAFT CONSTRUCTION

The shafts were started in the following order: Stoney Run and Frisby at about the same time, then Montebello, Alemeda, Charles and last Vernon. About 8,000 cubic yards of rock and earth were removed from the shafts during their construction. Charles, Frisby and Alemeda shafts were construction shafts only and were excavated 12 x 16 feet. Montebello and Stoney Run are permanent shafts, were excavated 12 x 16 feet and contain risers. For this purpose they were widened at the base for the foundations of the risers. Vernon shaft measures 25 x 12 feet as it has a well for unwatering the entire tunnel, as well as the wet well.

The Alemeda Street shaft was in soft material and was heavily timbered from top to bottom. All the other shafts were about equally divided between earth and rock. When driving the shafts three I-R jack hammers were used per shaft, drilling 5-foot holes. They were mucked by hand into tip buckets, the mucking crew consisting of a foreman and 7 to 10 muckers with two top men and a hoist engineer.

The shafts were timbered with 2 x 6, 2 x 8, and 2 x 10-inch vertical wood sheeting with 12 x 12-inch horizontal wales and 6 x 6-inch cage guides for the shafts which had cages for the removal of the muck. These guides were later used as pipe guides when laying the 84-inch concrete pipe.

The Frisby Street Shaft Showing the Mixer, Head Frame and Compressor Building

EQUIPMENT AT THE TOP OF THE SHAFTS

At the Vernon shaft, all air was supplied from Stoney Run through a 4-inch steel pipe laid on the surface of the ground and made up with Dresser couplings. No head frame or cage was used at this shaft, all the muck being taken out in tip buckets, using a Marion steam shovel rigged as a crane. This shovel was used first for this purpose at Charles Street and, when that was complete, was transferred to Vernon and finally was used to handle all the concrete, after the use of the tunnel cars was discontinued. A Ransome 27-E paver, with hand batching of the aggregates by volume in wheelbarrows, mixed all the concrete for use from this shaft. The concrete crews were about the same at all the shafts, consisting of two wheelbarrow men and two shovel men loading the wheelbarrows. One man emptied the two bags of cement into the skip for the 1:3:6 concrete. There was a mixer man and a man watching the chute to the 6-inch pipe through which the concrete was chuted to a storage hopper below. This procedure was followed both for the invert concrete and for the concrete which was placed pneumatically around the concrete pipe.

At Stoney Run shaft a McKiernan-Terry National 10-ton, 3-drum electric hoist was used for handling the pipe which weighed from 14 to 16 tons per 12-foot length. The hoist handled it with an 8-part line. A Clyde single-drum hoist was used for the cage before the placing of pipe began. A stationary 1,300-foot I-R compressor, operated by an electric motor, supplied air at 80 to 100 pounds pressure for this and the Vernon shaft. At Stoney Run shaft the cars came out on a ramp at an angle and were dumped directly into the stone hopper of the crushing plant which supplied aggregate for the entire concrete work from the stone mucked from the tunnel. This shaft handled 3,021 feet of tunnel.

The rock crushing and screening plant consisted of a receiving hopper where the rock was dumped into either of the two gyratory crushers, furnished by the Kennedy-Van Saun Manufacturing & Engineering Co., New York. One of the crushers handled the smaller material and the other the larger rock. From the crushers the material was elevated by a bucket elevator to the cylindrical screens which screened out all but the ¾-inch material that was used for the coarse aggregate and the fines which were used for sand. All other material was wasted. Some sand was purchased when the run of fines was not quite the size desired for the best results.

The Charles Street shaft was equipped with a stationary Gardner-Denver 14 x 8 x 10-inch twin-air compressor driven by a 100-horsepower 3-phase Westinghouse induction motor. As there was no cage at this shaft, all the muck came out with buckets handled by the Marion steam crawler crane.

At the Alemeda shaft a 3-drum American hoist driven by an electric motor handled the cage for the muck cars which were raised and dumped into the stone hopper. A stationary I-R Imperial Type No. 10 compressor of 300-foot capacity supplied the air at 80 to 100 pounds pressure for this shaft.

All hoisting at the Montebello shaft was handled by a stiffleg steel derrick with a Clyde hoist. A belt-

driven I-R Imperial Type No. 10 stationary air compressor supplied air at 354 feet per minute for this shaft and was operated by a 55-horsepower Type P.O. I-R oil engine. There was no cage so the muck was removed in tip buckets with the derrick.

TUNNELING OPERATIONS

While drilling practice was not uniform throughout the job because of the difference in the rock, there was sufficient similarity to permit a general description of the drilling practice in one paragraph without devoting a separate description to each heading. The headings were driven with two or three I-R No. 75 drifters mounted on vertical columns and using 1¼-inch round drill steel. The drill crew consisted of three drillers and three helpers, one "nipper" or steel carrier, and a foreman. The drill round consisted of 6 to 10 cut holes 11 feet long, three bench holes 11 feet long and the remainder of the 27 to 36 holes per round, were the ring holes which were drilled 9 feet long. The drill steel was sharpened at blacksmith shops located at Stoney Run and Frisby Street. The Stoney Run shop ran 24 hours a day and the Frisby shop about 16 hours. These shops were equipped with an I-R No. 26 fuel oil heater and a Gardner-Denver electric sharpener.

Du Pont 40, 60 and 75 per cent gelatine dynamite was used for blasting but very little of the 75 was used and that only experimentally. The holes were loaded more heavily where there were no houses near. When work was close beneath a hospital the rounds were cut to 5 feet and the hospital authorities were notified before every blast to be sure that there was no emergency operation under way. If such was the case, the blast was delayed until it had been completed. The loading per round varied from 225 to 380 sticks of explosive, depending upon the location and the character of the rock. An analysis of the explosives used by the contractor showed that for the months of May, June and July, 1931, when tunneling was most active, 34.5 sticks of dynamite were used per foot of tunnel, or 17.2 pounds for the 112-inch tunnel diameter as the neat line was 6 inches outside the pipe which measured 84 inches inside diameter and 100 inches outside diameter.

For 860 feet west from Montebello, Gardner-Denver jack hammers were used because of the soft rock. This was mucked by hand. The tunnel holed out in four places. In one place the line was 2 inches out, in two it was ½ inch out and in the fourth ¼ inch out. The variation in grade was from ¼ to ½ inch.

CHECKING THE NEAT LINE

To check the work as regards the tunnel section, the contractor's engineers devised a template which, when mounted on an industrial car on the track which was concreted in the invert of the tunnel, occupied the exact location of the pipe. From the periphery of this it was easy to determine whether the neat line was the full 6 inches from the outside of the pipe. Also for purposes of checking the amount of concrete placed about the pipe, another device was developed by city engineers. It consisted of a wheel with 36 spokes which gave the location of 36 radial stations for measuring the diameter of the tunnel at 2-foot intervals. By averaging these radii, a very close check was possible on the amount of concrete needed for any section.

The Baltimore Water Tunnel Showing the Paved Invert and the Tunnel as Shot

VENTILATION DURING WORK

The contractor chose to ventilate the tunnel by pressure blowing during the work. The 6-inch steel blower pipe with Dresser couplings was strung along the wall of one side of the tunnel near the top and carried to within 100 to 200 feet of the heading. Connersville blowers with 50-horsepower motors were located at Frisby and Stoney Run shafts and Buffalo Forge Co. blowers with 25-horsepower motors at Montebello and Alemeda shafts. It required from 30 minutes to one hour before instrument work on line could be resumed after a blast because the fumes traveled so slowly back from the face.

MUCKING

All of the tunnel section west of Alemeda shaft was mucked by hand for about 1,000 feet. A Myers-Whaley mucking shovel was used between Stoney Run and Vernon and another between Stoney Run and Charles Street. From Frisby shaft, both east and west, Nordberg-Butler air shovels were used. For hauling the muck cars on industrial railroad track 10 "hay burners", real four-legged mules, were used. A total of six Mancha electric mules were used for the bulk of underground hauling of muck. The batteries for these electric locomotives were not removed from the shafts for charging but were recharged at the bottom of the shafts when the locomotives were not in use for hauling pipe or concrete. Twenty Koppel mine cars of 37-cubic foot capacity were used where the spoil was removed by cages as the cars were raised and then dumped by tipping the entire car. Where there were no cages, flat bottom cars were used.

Because of the excessive draft in the tunnel after it was holed through, a number of temporary bulkheads were installed. A wooden bulkhead with a door was installed near Vernon shaft and another just east of Stoney Run shaft on the high level. Canvas bulkheads were used at various other points.

BAD GROUND

From Alemeda shaft east for a distance of 1,400 feet, the ground was very soft with much water all the way from the surface to the bottom of the tunnel grade.

A 15-ton Section of Concrete Pipe on the Carrier in the Tunnel

As this work was excavated it was timbered in several different ways in an endeavor to overcome the crushing of the timbers by the motion of the ground. The section was sheeted behind the timbering and grouted but this seemed to have no appreciable effect. A section 100 feet or so in length was put in as a liner plate tunnel but the plates were not heavy enough and the movement of the ground caused the plates to get out of line and grade so that it was necessary to break the continuity of the section several times to get back to line and grade. The muck flowed in between the broken sections and finally the work was discontinued until pneumatic equipment could be installed. A temporary shaft was put down in this section in clay. When tunneling had progressed about 30 feet from the shaft, the soft muck blew in from the bottom and face of the heading. This caused a settlement of the ground within 50 feet of the shaft and work was immediately abandoned at this shaft. This 30-foot length of tunnel was dry until the muck blew in.

Tunnel Drainage During Construction

The grade of the tunnel is uniform from Montebello down to Vernon so that the tunnel could not be drained both ways toward any one of the shafts. Sumps were established at Stoney Run, Charles Street, Frisby Street and Alemeda Street shafts with Fairbanks-Morse and Cameron electric-driven centrifugals lifting the water from 84 to 100 feet to the surface. There were no large inflows of water from seams in the rock during construction. A few ¼ and ½-inch streams were encountered which were covered with metal roofing to confine the stream and carried to the underdrain.

During construction an interesting case of the benefits of blasting was shown. A man in the section where the tunnel was located had always been troubled with a wet cellar and had installed a small electric pump in a sump, operated automatically. One day when work was under way beneath the street adjacent to his home, the pump stopped working just as a blast was set off and as it failed to start up again the man investigated, believing that the pump had been damaged by the blast which could be felt in the vicinity. To his amazement he found that the sump was dry and it has remained so ever since.

The Paved Invert

Reference has been made several times before in this article to the paved invert of the tunnel. Although the tunnel was lined with a concrete pipe the invert was lined with concrete in advance of the placing of the pipe. When the invert was poured an industrial railway track was cast in the invert to provide a means of carrying the large pipe forward. A drainage tile was set in the bottom, consisting of first 4-inch farm tile but this proved to be too weak for the location. Then 4 and 6-inch vitrified pipe was used and finally 6-inch steel blower pipe which had been used for ventilation. Where the tunnel section was dry it was laid with screw joints but where there was water it was laid with butt joints. If water accumulated on the invert, it was a simple matter to puncture the pipe with a crow bar and let the water into the drain.

The Pipe Contract

The contract for the 84-inch inside diameter reinforced concrete pipe was awarded to the Lock Joint Pipe Co. of Ampere, N. J. This company erected a plant for the local manufacture of the pipe at Calverton Road and the Pennsylvania Railroad, Baltimore. Each pipe, which was cast on end, contained a welded steel cylinder of approximately 90-inch diameter, an outer cage of rectangular steel reinforcing bars, and an inner cage of wire mesh. The amount of steel in the cylinder and bars depended on the pressure to be met. The pipes were poured in metal forms which were stripped the day after casting. The pipe was cured in an atmosphere of steam until the third day.

The steel rings which form the joint surfaces are an integral part of the steel structure of the pipe. When the pipes are placed together, the bell and spigot ends telescope each other, forming a wedge-shaped cavity designed for the gasket. An endless wedge-shaped, fibre-filled lead gasket is placed in this cavity and is caulked from the interior of the pipe after it has been laid. In making the pipe, over 8,000 cubic yards of high strength concrete was used with 1,700 tons of steel in the cylinders and reinforcing cages. The pipes weigh from 14 to 16 tons each. There were two strengths of pipe. For the lower level between Vernon Street and Stoney Run 10-gage sheet was used for the cylinder and for the remainder, 12-gage sheet was used. The reinforcing was varied accordingly and the concrete was uniform throughout.

Placing the Pipe

Handling concrete pipe 12 feet in length and weighing in the neighborhood of 15 tons each is not easy. The pipe was hauled from the pipe yard by a special trailer pulled by a motor truck. At the shafts the pipe was unloaded and rolled on two pairs of 15-inch I-beams with wood block spacers, a heavy wire rope sling passed under the pipe and attached to the hook on the 8-part line of the hoist and the pipe lifted sufficiently to permit rotating it 90 degrees to let it pass between the pairs of I-beams and down the shaft. The head frames were strengthened before the pipe laying began as they were not heavy enough for the pipe, as originally built.

At the bottom of the shaft the pipe was allowed to rest on the rails until the Lock Joint patented carrier

was placed inside. This carrier consists of two pairs of trucks of four wheels, each with jacks and bracing so that they can lower or raise the H-beam which carries the pipe with timbers between the beam and the inside of the pipe. The rear end of the H-beam is attached to the top of the electric locomotive so that when the rear truck jack is raised, the front truck is lifted clear of the track and can be run through the pipe without touching it. To move the front truck through the pipe it was necessary to collapse the jack on the front truck. Then the front truck was dropped onto the rails, the timbering placed on the top of the H-beam to cushion the weight of the pipe against the H-beam, and both jacks raised until the pipe was lifted clear of the track and it was then ready to be moved forward by the locomotive.

The actual placing and connecting up of this pipe with the last pipe laid was a straightforward piece of careful adjustment of the jacks on the carrier. Before the pipe was moved into position for laying, a third jack was set up in place inside of and close to the end of the last pipe laid. This latter jack had both vertical and lateral adjustment to permit transferring the load of the H-beam and pipe from the front wheel truck to the fixed jack inside the pipe which carried a roller at the top. After the load was transferred the jack of the front truck was collapsed to permit this truck to be placed inside the pipe being set so that the spigot of the pipe could be pushed into the bell. The actual pulling into place was done with a chain block attached to a post firmly wedged in place in the last section of pipe laid. The contractor's pipe setting crew consisted of a foreman and six men. This crew, which was duplicated at each heading where pipe was being laid, was able to lay four lengths of pipe in one 10-hour shift. This 48-foot length of pipe was concreted by the other crew in the second shift.

Placing Concrete Pneumatically Around the Pipe

The method of mixing and chuting the concrete from the top of the shafts to storage hoppers below has already been described. Each pipe laying crew had a corresponding concreting crew with a Ransome pneumatic placer. This machine was operated by air from the high pressure line 4 inches in diameter which was carried on the invert of the pipe already set or along the tunnel proper. The 5-train cars of concrete were run up onto a trestle formed of track, mounted at varying heights on industrial railway trucks so that they could be moved out of the way rapidly when the pipe laying crew returned. Easton side-dump cars were used for handling the concrete and delivered their loads into the hopper of the Ransome machine which held two car-loads. The machine placed 14 cubic feet of concrete per shot and each car of the train held 18 cubic feet of concrete so that the 5-car train required 6 shots to place the concrete around the pipe.

The concrete was shot through 10-foot sections of the old 6-inch steel blower pipe set up with Dresser flexible joints. There were some 5-foot sections of pipe available, which were used to replace the end 10-foot section where there was a hole to be filled, particularly in the roof section. The 10-foot lengths were regularly removed as the section was filled. The space around the end of the last concrete pipe was bulkheaded about 8 inches from the end so as to confine the concrete as it was placed. The concrete cars were moved to and from the shafts by the Mancha electric mules and up the ramp by an I-R air hoist.

Pipe in Open Cut

At the Montebello end of the 84-inch concrete pipe line there were 692 feet of the pipe laid in open cut to connect the second filtered water basin with the tunnel. This will make it possible to draw water from either or both of the basins as needed. A Lima 101 power shovel was used for the excavation. The pipe was laid in open cut with the same rig used in the tunnel. The pipe was placed on the I-beam carrier at the end of the trench and hauled over 24-inch industrial track to the point of laying.

Special Construction

At the Montebello end there are also two valve vaults for 60-inch valves and a pit for the Builders Iron Foundry Venturi meter. At the permanent shafts the Lock Joint 84-inch reinforced concrete pipe connects with ½-inch plate tanks which are welded and riveted and with all joints caulked. This tank forms the riser or wet well in the shafts. In building the steel risers, the riveters had platforms built of a number of boards crossed so as to form sufficient area to walk on comfortably. These platforms were suspended in the shell with rods having the ends so bent as to form hooks which went over the edge of the shell and also other bends where the rods were just inside the tank so that the crane above could pick up the platforms and remove them easily.

A 48-inch Lock Joint reinforced concrete pressure pipe runs from within 30 feet of the top of the Vernon riser for a distance of 540 feet to the top of Druid Lake 115 feet above. This forms a surge line to prevent water hammer in the long tunnel in case it is ever shut down for any reason. The surge line has no valves so that it will always be free to act as a safety valve on the line.

Personnel

The water utility in Baltimore is not a separate department as in most cities. It operates as a Bureau under the Department of Public Works. The work

(*Continued on page 30*)

The Pipe in Place Before Grouting

Bulk Cement Batching

in a

Tobacco Warehouse

NEATLY tucked away under a corrugated iron roof, fully protected from the weather and with a depressed roadway already in place, a new type of bulk cement handling plant was operated by the H. E. Wolfe Construction Co. on its concrete base job running through College Grove, Tenn., south of Nashville. For the early part of the job, the contractor used bag cement and required four men in the cement car, tossing out the bags of cement onto the batches in the trucks. Then another man opened the bags as the truck backed to the paver skip.

The cement was delivered to the tobacco warehouse floor in two separate bins, formed by partitions built up from the floor, by a subcontractor using watertight tank trucks. The cement, which was loaded in Nashville, was hauled 31 miles by the shortest route which included a wide detour because of construction on the through route from Nashville to College Grove. Not only was the contractor blessed with a well-built warehouse at his disposal but Fairbanks platform scales, formerly used to weigh the tobacco, were built into the floor of the building at just the right location for use in weighing the cement. The drive through which the farmer's trucks passed to unload their tobacco was used as the loading drive for the batch trucks.

A platform was built over the driveway in which was set a frame containing the rails for the cement carts and the control gates and chutes for dumping the cement into the cement containers which were swung over each batch so as to tip over and empty when the batches were dumped. The frame, gates and cement carts were furnished by the Stevens Metal Products Co. of Niles, Ohio. The contractor provided two separate bins for the cement so that one could be used for batching while the other was being filled by the hauling trucks. Thus there would be no confusion between the two operations. The batch trucks carried three batches each but the contractor provided six cement carts so as to keep the men moving and to avoid any delay at the bulk cement batching plant. The carts were loaded by hand shoveling at the bins by two men. Two wheelers took them one at a time to the scales which were at the entrances to the bins. When the state inspector had checked the weights and one scale man made up the slack or took out the overage, the wheelers pushed the carts up a ramp about 25 feet long with a slight grade. The center strip of the ramp was equipped with slightly raised cleats so as to give the wheelers plenty of grip with their feet. At the top on the dumping platform the carts were lined up on the iron frame facing the same direction in which the truck was driving.

There were three dumping positions corresponding to the location of the three batches in the trucks. One man below to check the position of the truck and operate the toggle gates called to the dumper on top "Dump No. 1" and the dumper turned the inside body of the cart completely over within the outer shell, delivering the cement to the chute and below, the man opened or closed the toggle gates to control the rate of flow into the cement containers. By starting the flow slowly and opening it gradually the usual explosive spurting of the cement when dumped into closed containers was overcome. The second and third position carts were dumped in order and the carts taken away by the wheelers as soon as dumped. A shorter and steeper ramp led from the dumping frame around the far side of the scale house to the bins.

Batching the Aggregates

The sand and gravel were shipped in to the spur track near the bulk cement plant in gondola cars and unloaded with a Northwest crane with a 35-foot boom and ¾-yard Blaw-Knox clamshell bucket either to the stockpiles or the Butler weighing batcher plant. The batch trucks backed under the batchers, received their three batches and then drove ahead about 400 feet to the cement batching plant. The individual batches consisted of 2,116 pounds of gravel, 1,220 pounds of sand and 470 pounds of cement. When operated with bag cement the batch was made up with five bags.

The batch-truck fleet consisted of a maximum of seventeen 3-batch Hug and Indiana trucks. Each truck was equipped with a cement container for each batch,

H. E. Wolfe Construction Co. Used Unusual Set-Up on 10.82-Mile Concrete and Asphalt Top Project

consisting of a sheet steel box extending all the way across the truck body and with a stub shaft at each end to permit swinging over when the batch was dumped. A wooden cover was placed over the top during hauling.

The aggregate batching crew consisted of the craneman, one man in the cars cleaning up, one weigher, and one man below spotting the trucks. As mentioned before, four men were used in the cement cars when running with bag cement.

Grading

The grade was prepared by an Adams No. 12 leaning wheel grader pulled by a Caterpillar Sixty which was also used to pull the Lakewood subgrader along the 8-inch Blaw-Knox steel forms, when set, to cut the final grade. The excess dirt was moved to spots where the grade was low with two Galion and two Western fresnos with two mules to a scraper. A Carr scarifier was used to break up the hard clay where the grade was running high and a Lakewood grade-rooter was used for the same purpose. An I-R portable compressor was used to furnish air for the jack hammers which were used where outcrops of rock occurred. There was one stretch of rock where the grade was redesigned to bring the project within Federal Aid specifications. This was blasted out in small pieces usually ranging from 1 to 2 feet square and about 4 inches thick.

Large Gang on Form Setting

The trench for the forms was cut at first by hand, and the forms set, by a crew of twenty-three men. Two men tamped the forms with tamping irons to insure uniform bearing and a form liner worked back from the setting crew. Later a Carr Formgrader was purchased which eliminated the cutting of trenches by hand and the tamping. A Galion-Fordson roller was used to compact the final grade and to roll out the truck ruts.

As is usual with clay it showed its wettest spots at the high points of the grade during dry weather where

BATCHING AND CONCRETING OPERATIONS ON THE H. E. WOLFE CONSTRUCTION CO. PROJECT SOUTH OF NASHVILLE, TENN.

1. Layout of the batching plant, showing the aggregate cars in the background and the crane for handling the aggregate from the cars or stockpiles. 2. Planking made possible the operation of heavy batch trucks over soft spots in the cuts. 3. The organization around the paver. 4. Finishing operations and bringing up concrete for the curb.

the water seemed to be raised by capillary action. In these spots, and all the time following rainy weather, the grade had to be planked for the batch trucks as they backed from the Blaw-Knox turntable to the paver. The fine grade was finished with a 2-inch crown and the concrete slab for the base of the fluxed limestone rock asphalt top had a 1-inch crown. One man of the fine grade crew ahead of the paver oiled the forms with a bucket of oil and a short handled brush.

Placing the Concrete

The batch-truck dumper as usual was a busy and dusty man and was assisted by one man who emptied the bag cement when that was used and who climbed onto the trucks when the bulk cement was used to see that the cement had flowed completely from the containers. The MultiFoote 27-E paver pulled two Carr grade planers from which two men were employed to shovel out the excess dirt cut from the fine grade. Three puddlers handled the placing of the concrete after it was spread by the paver bucket and also spaded the concrete against the forms. This crew poured a maximum of 1,750 feet of 7-6-7-inch concrete base course 20 feet wide per day.

An Ord finishing machine with operator screeded and finished the slab and were followed by two men on a double rolling bridge who used a 14-foot longitudinal float known locally by the negro labor as the "charley horse." These two men also went back and used the 10-inch belt to pull off the excess water and laitance.

At first concrete for building the curbs, which measured 6 inches wide and 1¼ inches high, was carried back from the puddle by two men using a cradle-like carrier. They worked both sides, carrying first for one and then for the other. There were two curb form setters, one on each side, one curb builder on each side and a finisher on each side. Later the finishing machine screeds were equipped with an attachment which finished the roadway 1¼ inches below the top of the forms and pushed the material into place for the curb, leaving the curb practically finished with the exception of a little touching up by hand. This eliminated all of the labor described earlier in this paragraph except one form setter and a finisher on each side.

Expansion and Contraction Joints

Every 300 feet a 2½-inch open expansion joint was constructed and every 50 feet a dummy contraction joint ¼-inch wide and 2 inches deep was left open and the black top rolled in. Some of the expansion joints were made with a steel plate across the joint and covered with burlap which was sealed to the concrete by bitumen so as to prevent the plate moving when the top was placed and rolled. As the steel plate covering did not prove satisfactory on this project, it was discontinued after about half the joints had been made.

Curing and Broom Marking

Immediately after the belting two men broomed the surface with steel brooms to score the top and provide a better surface for the bonding of the asphalt top when placed. These same men spread the burlap which was sprinkled before placing and after, if it dried out. The burlap was left in place and sprinkled for 72 hours with one man for each 1,000 feet of concrete to be wet down.

Three to five men pulled the forms while two men pulled the curb forms and carried them ahead to the curb builders. The side forms were carried forward on a 4-wheeled wagon with a skeleton body.

Water Supply

Water for all the concrete and curing operations was furnished by a Domestic triplex pump from a small creek through a 2 and a 2½-inch line laid along the shoulder. The paver carried two 2-inch hose each 150 feet long. The hose tops on the water line were spaced every 200 feet.

Personnel

This 10.82-mile paving project with 20-foot 7-6-7-inch concrete base course covered with a 1½-inch surface course of Alabama fluxed limestone rock asphalt was built by the H. E. Wolfe Construction Co. of St. Augustine, Fla., with William P. Hix as Superintendent. For the Tennessee Department of Highways and Public Works, A. P. Connell was Resident Engineer.

A Remarkable Record

THE transportation of explosives is naturally hazardous but a report of the bureau for the Safe Transportation of Explosives and Other Dangerous Articles, which was organized in 1906 under the auspices of the American Railway Association, 30 Vesey St., New York City, reported recently that all dangerous explosives offered the railroads in the United States and Canada during the year 1932 were transported with a 100 per cent safety record of no deaths, no injuries and no property loss. The explosives involved included dynamite, other high explosives and black blasting powder. A similar record was made during 1931 and during 1930.

During the last six years, more than 2,000,000,000 pounds of commercial explosives have been transported over the railroads of the United States and Canada without the loss of a life and with a total money damage of only $213.

The U. S. Forest Service Operates This A-C 35 Tractor with a Rock Rooter Blade in the Mt. Hood National Forest Near Portland, Ore. Buried Rocks Are a Great Source of Trouble Where a Road Is Being Built by a Bulldozer and Tractor. The Rooter Blade, Which Is Detachable, Solves the Rock Problem.

A Simplified One-Sheet Cost Record *for* Contractors

By
L. L. West, Jr.

Formerly Resident Engineer, Bridge Department, Louisiana Highway Commission

HOW many contractors who do $100,000 worth of work per year, or even larger, keep and use cost records showing the unit costs of each individual operation during the construction of their projects? Probably very few of them. Ask them why, and the replies will fall into one of the four groups which are discussed below.

> *"I do not maintain any central office or clerical help; so I have no opportunity to analyze the costs of my operations. I determine my profits or losses by the simple matter of checking the amount of my bank account at the beginning and the end of the job. I check my costs approximately during construction and determine in this way how my work is progressing."*

All right! Generally cost records are the work of an experienced and qualified accountant and are not generally understood nor readily applied by the average contractor. But must the job analysis be so complicated that an office force of trained accountants and bookkeepers will be necessary to keep and explain the compilation to the man who is primarily interested in the results? The answer is emphatically, "No." In these times of close bidding and low profits, it is absolutely necessary that all organizations cut their overhead and operating costs, making it impossible for smaller contractors to avail themselves of bookkeepers, etc., generally associated with the idea of cost analysis. Even in boom times, it is not necessary to have an office force to keep an accurate distribution of the unit cost of each item of the contract. With very little effort and a little thought and planning, it is possible to compile a form that will show the actual total cost of any contract function for any required period and for the job to date; thus, the contractor would not have to wait until the end of the job to determine his profits or losses. It is only necessary for him to look at his cost sheet.

> *"I am afraid to use a cost record because it might mislead me in bidding on future work due to varying financial and physical conditions, and I prefer to rely on approximate unit costs and my judgment. I have succeeded in making a reasonable profit in the past and see no reason for changing my methods now."*

This man has a lack of understanding of one of the primary functions of the unit cost analysis as he fails to take into consideration the value of the cost record during the course of construction. Costs on a construction job are valuable, and not misleading, in future bidding if applied with the same judgment that is used in the approximate method; and they will prove themselves much more dependable. They may even be accurately applied to the financial portion of the bid prices if the contractor will consult and apply the various charts and index numbers published in construction periodicals and daily newspapers. The physical features of the proposed work must always be computed on the basis of sound judgment and experience. The lack of understanding of the function of this type of record is clearly indicated by the fact that the value of the cost record in cutting down excessive costs and leaks during the actual construction period is not mentioned. Herein lies the principal value of the type of cost record that is to be discussed. If the contractor is able by his accounting to determine that one of two similiar units actually costs more than the other to build, it is axiomatic that he will be interested in determining why this is the case. With this accomplished, the cost record will have performed a very valuable duty in that when the difference in cost is noted, the cause will be ferreted out. Sometimes the causes are outside of human control, but usually they are due to "leaks." These leaks may be chargeable to lack of judgment, lack of proper foresight and planning, carelessness, or the human factor. Regardless of the cause, the man who is investing his money in the operations will be informed of the leaks at the time they occur, which is the most important time from any point of view. The effect and cause being determined by the cost record, it remains for the contractor to see that they do not happen again. This speeds progress and increases the profits on all future operations.

> *"I use all of my crew in performing all of the operations on my jobs, and there is no separation into units on the different operations, making it difficult if not impossible to keep my labor costs separated as any cost record would require."*

This contractor has either been misinformed regarding the difficulty in separating labor costs or has never examined a cost record which was not prepared by an

accountant. It is a very simple matter for the time keeper, or the foreman if he keeps his own time record, to separate any crew by making simple observations at fairly regular intervals during working hours.

"I am making money. Why be bothered with all of these unnecessary details?"

This is the man who does business on a basis of luck. No cost record or any method that would entail the slightest output of energy would interest him. As he says, he is probably showing a profit, but does he ever consider the fact that this profit might be increased by a little more attention to what should be routine details?

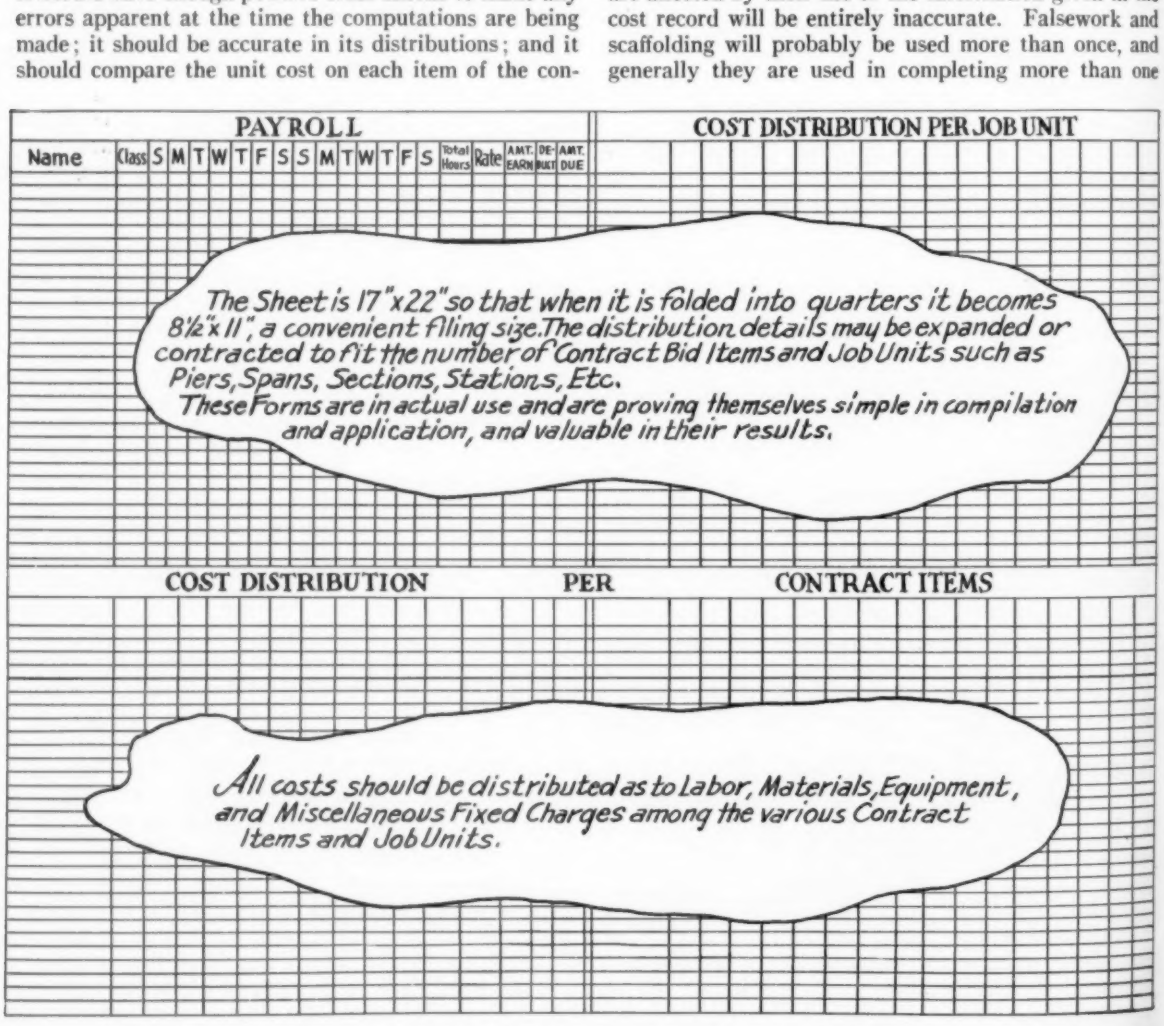
Simplicity Is Essential

An accountant's record is imperative on the larger and more complicated construction projects, but the cost of compiling and the complication involved in interpreting the results makes it prohibitive from the standpoint of the smaller operator. Records on smaller projects should be compiled on one sheet. Such a record should be simple in its preparation and interpretation; it should have enough positive cross checks to make any errors apparent at the time the computations are being made; it should be accurate in its distributions; and it should compare the unit cost on each item of the contract with the unit bid price so simply that any ordinary man could detect on examination those items whose operations should be studied.

It is a simple matter to formulate a tabulation that will fulfill all of the above requirements, and it is equally simple to keep the computations abreast of the progress of the work. A tabulation of this sort involves the following cost separation: Labor, Materials, Equipment, Supervision, and Miscellaneous, including fixed charges such as bond, insurance, etc. With such a separation the "leaks" are readily located and analyzed.

Labor costs are the simplest to separate for a satisfactory analysis; but some contractors think them the most difficult, particularly if there is no unit division of the crew. It is possible, however, to separate these costs simply and with very little effort.

Material distribution is not quite as simple as it seems on first consideration. Cement, sand, gravel, stone, steel, etc., present no difficulties; but form lumber, falsework and scaffolds, sheet piling, well points, cribbing, hardware, small tools, etc., are used over and over and often on two or more contract items. These costs should be divided properly among the items which are affected by their use or the information given in the cost record will be entirely inaccurate. Falsework and scaffolding will probably be used more than once, and generally they are used in completing more than one



An Outline of the Author's One-Sheet Payroll and Cost Record

contract item. They should not be distributed entirely to the major item. An illustration will explain how this sometimes happens in actual practice. On bridges falsework is primarily erected to place structural steel spans or concrete girders. On a recent bridge project in Louisiana, the contractor used double deck falsework, and built the lower deck so that it could be used for placing cofferdams, excavating, driving foundation piling, pouring seal courses, placing pier reinforcing steel, and building forms and placing pier concrete. After his piers were completed to the elevation of this deck, he placed the top deck of falsework. From this elevation he completed the piers and erected the steel spans. It is evident that the cost of this falsework should be divided among the items that involved its use. This proportion should be based on the ratio of the revenue received from these items. Some may argue that this is not the proper way to apportion this cost because some items require more use of this falsework than the ratio of the revenue will show. Whenever this is done, the accountant's cost analysis must be used, and we have complicated a tabulation that should be simple, and we have not proportionally increased its value.

Equipment is another item of cost distribution that can be made complicated or simple, with very little difference in the value of the results. A piece of equipment is purchased, used, kept in repair, and finally worn out and junked or abandoned. The total cost of this piece of equipment is the sum of its initial cost, the cost of repairs during its active life, and the interest on the investment, less its salvage value, if any. But this does not offer any aid in distributing the cost of this piece of equipment while it is being used. This can be simplified by computing equipment costs on a daily basis. It may be said that this is impossible because this daily cost cannot be computed as it is not possible to determine the actual number of days that it will be used in advance of the construction. It will be admitted that it is possible to estimate the depreciation of any piece of equipment for the first year, the second year, the third year, and so on. This can be done very simply and with a great degree of accuracy by using a tabulation compiled by the George F. Smith Co., Equipment Distributors, St. Louis, Mo., and published in CONTRACTORS AND ENGINEERS MONTHLY, of July, 1931. If the equipment was not used for the entire year it is only necessary to figure the depreciation for the time that it was in use, subtract this from its original value, and use the result as the basis for the computation of the daily rate when the equipment is placed in use on another project. Some will say that this is most inaccurate because most equipment will depreciate more rapidly when idle than when in use. Admitting this, to certain limits, is it not also a fact that it is fairer and more accurate from the smaller contractor's point of view to charge the depreciation against the equipment when it is earning revenue?

The charges for supervision, bond, insurance, and miscellaneous small overhead costs are fixed amounts and present no difficulty in arriving at the totals. There may be some difficulty in the item distribution, and there will be a variety of opinions as to the accurate and proper method of distribution. This can be left to the judgment and experience of the individual without any fear of the final results being inaccurate, because the totals represent a very small per cent of the total cost of the work. However it be apportioned, it will probably be simpler to distribute it on a daily basis.

This method of cost distribution is relatively simple and easy. Use of a tabulation of this type has shown that it takes only fifteen minutes a day by actual timing to keep the record to date. When the laborer's time is written up for the day, it takes but a moment to write down the cost distribution, particularly if all of the data are included on one sheet. At the end of the payroll period, it takes only one hour to bring all totals and unit costs to date. The engineer on the job can usually supply the quantities in place, and eliminate the additional work that this would require.

MORE INFORMATION?

This article has been written with particular reference to bridge construction cost data, but there is no reason why a slight revision would not make it useful for any type of construction. The author, L. L. West, Jr., formerly Resident Engineer, Bridge Department, Louisiana Highway Commission, will be glad to correspond with any readers who are interested and supply any further details that may be requested, if addressed at R. F. D. No. 1, Lake Providence, Louisiana.

Excavation and Grading in the High Sierras

THE Contoules Construction Co. of San Francisco, Calif., is now awaiting the coming of warmer weather and the melting of the snow to resume grading on Project 1D3 of Generals Highway, Sequoia National Park. Starting at an elevation of 6,900 feet, the work crosses the summit of the mountains just north of Little Baldy Peak at an elevation of 7,370 feet and descends the eastern slope to an elevation of 6,840 feet. Although only 2.88 miles in length, this roadway project involves 127,000 yards of roadway excavation, practically all of it in granite, with 40,000 station-yards of overhaul. Fills as high as 50 feet and cuts as deep as 20 feet are called for by the profiles. Work was begun on August 6, 1932 and suspended for the winter early in December. It was resumed in April, 1933.

Practically all of the excavation called for the use of explosives. The general method has been to blast the rock into pieces which could be picked up with the 1½-yard Northwest shovel, loaded into a LeTourneau chariot-type dump cart and hauled by a Caterpillar Fifty to the fill. For smaller rocks and earth two 5-yard Sterling dump trucks have been used. A LeTourneau bulldozer, mounted on the same tractor used for hauling the heavy dump cart, was used for pioneering, spreading on the fills and similar work. One unusual method developed through the use of this unit was the employment of a line of cable from the LeTourneau double power unit to move large rocks.

Particular care had to be used in blasting because of the location of the work in a National Park where preservation of the natural beauty of the trees is imperative. Trees near the site of any blast were protected with corrugated steel shields, and rock thrown off the right-of-way or outside the neat lines of construction was dragged back by the power unit, picked up and either used in the fill or removed to a designated point so that there will be no scattered rock along the roadside. Much attention was given to landscaping, with all of the slopes rounded or flattened and in general, the natural topography was disturbed as little as possible.

Enlarging *a* Creek Channel *to* Prevent Flooding

Christie, Hutchinson & Burton Co. Ran a Railroad Down Valley Creek to Handle Rock and Earth Excavation in Birmingham, Ala.

WHEN a city is faced with the prospect of a creek channel flooding every time there is a good rain in the heart of the city, it is time to do something about it. That is just what the Engineering Department of the city of Birmingham, Ala., thought about Valley Creek which had been misbehaving with increasing frequency for the last few years. A bond issue for $3,000,000 was voted by the taxpayers in 1931 and work started on several sections of both Village and Valley Creeks. The work described in this article will be confined to a section 7,150 feet long which was started in February, 1932, and which was completed in 220 working days. It involved the handling of 78,000 cubic yards of earth and 45,000 yards of rock.

Put your equipment in a creek and what may you expect? Well, in this case the creek served a large section of Birmingham as a storm sewer and was crossed, allegedly, by a number of sanitary sewers, but the very distinct sewage odor from the waters of the creek in low flow told the story of considerable sewage reaching it in one way or another. If it rained hard in the heart of the city, there would be a fine wall of water about 4 feet high come rampaging down the creek and the shovels and locomotives had to be out of the way or get a good soaking. Another little problem that the contractor faced was that the wires on the exploders used in firing the dynamite did not work even with twice the usual number of caps. They could be fired two at a time on a 50-cap battery but that was too slow. It was found that the wire was too badly corroded by exposure to the acid water for even a few minutes to be effective. To remedy this only enameled wire was used and the shots could be made without trouble.

Stationary Equipment

In order to handle the large amount of rock that was to be drilled, shot and excavated, the contractor installed a rather complete compressor station with a Gardner-Denver 850-foot steam compressor and an Ingersoll-Rand 450-foot two-stage steam compressor. There were two 70-horsepower steam boilers to furnish power and a flock of eighteen jack hammers of which fifteen were frequently in use at one time. The maximum length of steel used was 14 feet. The steel was made up and sharpened in the contractor's own shop with an I-R steel sharpener.

Drilling and Shooting

The holes for the shots in the long rock cuts were 3½ feet apart across the creek and 4 feet apart along the line of the creek. It was found best to shoot the first row of holes instantly and use delays on the successive rows up to four. Hercules Gelamite A was used with delay exploders up to and including No. 4.

To give some idea of the quantity of rock that was

removed in any one section of the work, a knowledge of the cross section of the creek is necessary. The original creek channel as opened up about 35 years ago was 20 feet wide at the bottom and 35 feet at the top. This section was widened to 47 to 62 feet at the bottom and with a 1 to 1 slope for the sides.

Loading the Rock

After the rock was shot it was loaded with a P & H 600 shovel, a Bucyrus-Erie 42-B steam shovel and a Byers Bearcat ⅝-yard shovel. There were also a Northwest 1¼-yard dragline and a Link-Belt dragline with a 1¾-yard Omaha bucket. The draglines were used for stripping the earth cover and for the trench work for the disposal of the rock which proved an interesting detail of the work.

Hauling the Spoil

The best way that could be devised to handle the rock and earth from the creek was to load it into narrow-gage railroad equipment. The problem of disposal entered into the question very seriously as the city did not provide any dumps for the use of the contractor. He had to make arrangements with property owners along the line of the creek to permit him to fill low land with the rock and earth. As the earth came out first and the rock later, it was a problem to get the rock covered with the earth as the property owners invariably demanded. The contractor secured three dumps to which the rock was hauled. One of the draglines dug a trench on the property alongside the industrial track and the rock was dumped into the trench. Then the dragline dug on the far side of the trench that was being filled and used the new dirt for cover and thus opened a trench ahead of the dump at all times and automatically provided cover for the rock.

About ¾ mile of 36-inch gage track was laid with 60-pound rails. Two 18-ton American steam locomotives were used to haul trains of two-way side dump cars of 4-yard capacity. There were twenty-one cars on the job and the locomotives hauled them in trains of from three to six cars. The extra cars were spotted at such points as under bridges where the shovels could not work and the loading had to be done by hand.

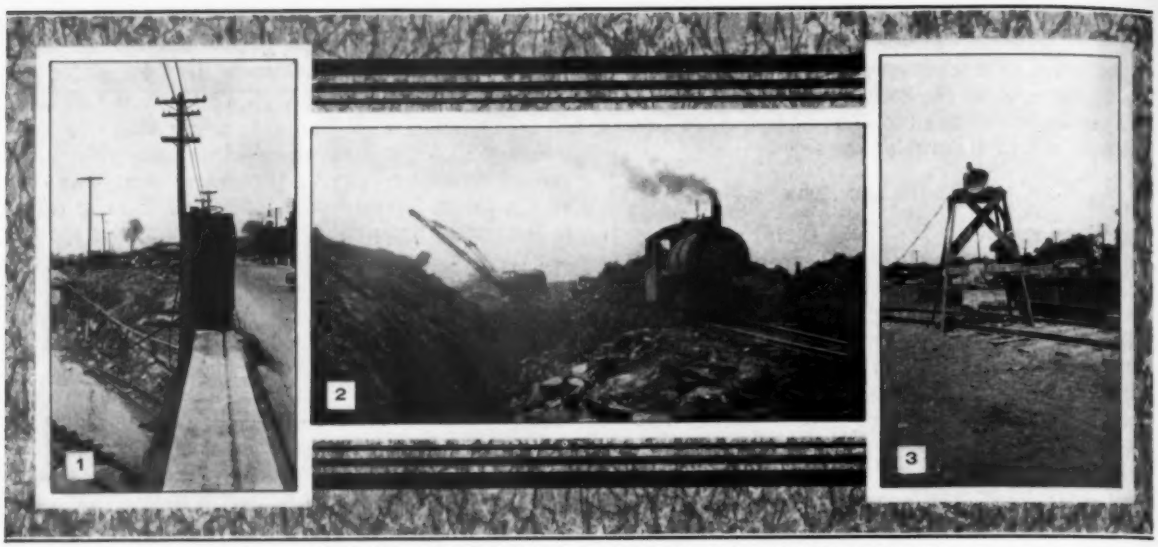
The labor organization for the moving of the spoil was an operator and oiler and pit man for the Bucyrus-Erie 42-B steam shovel, and an operator and oiler for the other machines. Each train had a locomotive engineer and a fireman who acted as brakeman and switchman for the train. The contractor had 156 laborers on his payroll most of the time and is credited locally with having done as much as any contractor in a similar line of work to help out the unemployment situation in Birmingham.

Where there were no bridges to hinder the use of the shovels on the lower end of the work, the contractor was able to move 1,200 cubic yards, place measurement, of rock in 24 hours working time. For night work the dumps were lighted with Graybar floodlights strung along on frames with current taken from the local electric company wires. Each of the dirt moving machines was equipped with a Kohler 4-cylinder, 1,500-watt electric plant.

Because it was necessary to get out of the creek on short steep grades just beyond bridges to make as short hauls as posible to the few dumps available, the grades

ROCK WAS PREPARED FOR REMOVAL BY EXTENSIVE DRILLING AND BLASTING

1. *The steam-operated stationary compressor plant.* 2. *Drilling and loading holes along the bed of the creek.* 3. *One of the many shots.* 4. *Loading out some of the rock during dry weather.*



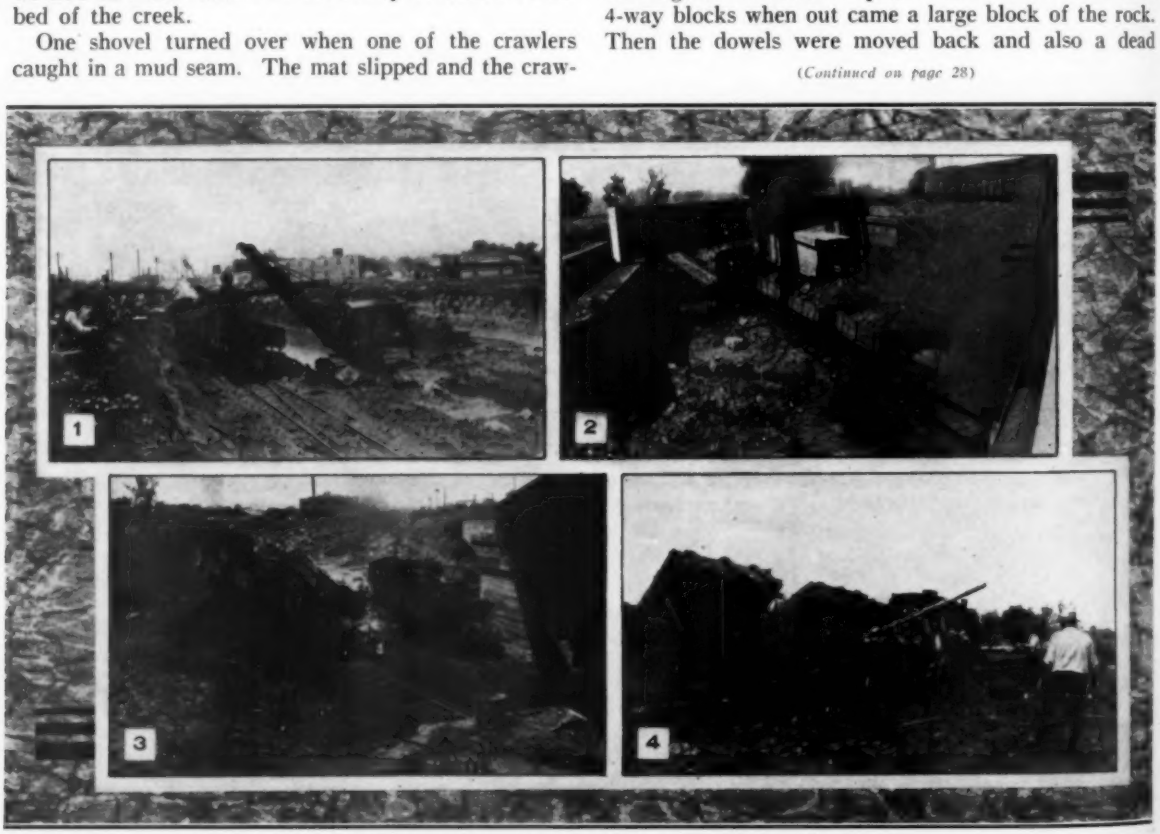
SOME INTERESTING DETAILS OF THE VALLEY CREEK PROJECT

1. A rectangular water tank was mounted on one of the girders of the roadway bridge to furnish water for the industrial railway locomotives. 2. One of the trenches where excavated rock was buried. 3. A floodlight on one of the dumps.

were as steep as 8 per cent. This made it necessary to cut the normal 6-car trains to 3 cars and of course reduced the daily output of the shovels. All the shovels worked on mats because of the seamy condition of the bed of the creek.

One shovel turned over when one of the crawlers caught in a mud seam. The mat slipped and the crawler followed it into a wide mud seam. To remove it the contractor put in four 2-inch steel dowels into the rock on the other side of the creek about 10 feet back from the edge and started to pull with two sets of double 4-way blocks when out came a large block of the rock. Then the dowels were moved back and also a dead

(Continued on page 28)



EXCAVATION AND HAULING IN ONE OF THE EARTH SECTIONS

1. Three-car trains with steam dinkies hauled out all the spoil. 2. Starting upgrade beneath the pair of railroad and highway bridges. 3. The steepest part of the grade out of the creek channel. Note the shuttle track at the right. 4. Dumping the cars.

Safety *for the* Occasional User *of* Dynamite

Some Worthwhile Hints About the Fuse

THERE are plenty of contractors who have occasion to use explosives very seldom and consequently have no expert powder-man in their employ. When one of these needs a few sticks of dynamite, he purchases it at the local hardware store with fuse and blasting caps and then goes out to the job to shoot the stumps or smash a boulder as the case may be. He knows that he has to get the explosive under the stump so he gets a crowbar or possibly a drill or auger and prepares the hole to receive the dynamite. He puts the cap on the end of a piece of fuse, cuts off what he thinks is enough to let him get to a safe place before the explosion occurs, punches a hole in the dynamite and puts his primer in the hole, either by itself or on top of several other sticks of dynamite. He then starts to light the fuse and right here his trouble begins.

Fuse consists of a small train of a specially prepared black powder enclosed in several wrappings of jute, thread, tape and waterproofing and it is not the easiest thing in the world to start this powder train to burn. If he holds a lighted match under the end of the fuse, the outside of the fuse will start to burn and the operator, when he sees the first sign of flame coming from the fuse, starts to sprint for a safe distance and waits for the explosion to take place. Now these wrappings of jute, tape and waterproofing are not very inflammable. These outer coverings may burn for a few seconds and then go out without communicating the flame to the powder core, in consequence of which, after waiting a while, he goes back to see what has happened. Either he uses another match and attempts to repeat the performance, or sometimes he lights a handful of grass or a roll of paper and holds that under the recalcitrant fuse. This may or may not succeed, but it is likely to set fire again to the outer portion of the fuse, and after a much longer time than is accounted for by the normal burning speed of the fuse it may reach the powder core and the fuse start to burn. Not being able to see this, the operator sometimes goes back again to see what has happened and occasionally he reaches the stump just about in time for the explosion.

Lighting the Fuse

However, if he has been properly instructed and realizes that the only part of the fuse which should be lighted is the powder core, he takes a knife and, after cutting off and discarding an inch of fuse, slits the end for an inch or so, opening it up to expose the powder. He then lights his match and while the head is still glowing puts it into the powder and is rewarded by seeing a healthy "spit" of the fuse which spurts out sparks and flame for two or three inches. Placing a stone or chunk of mud 3 or 4 inches from the slit end holds the fuse in place and allows the use of both hands to strike the match and light the fuse.

Another method of lighting the fuse which is practiced by experts, and which requires a little practice to effect, is to use a box of safety matches and after slitting the fuse, hold the head of the match firmly against the end of the fuse in its exact center so that it touches the powder core and then strike the head of the match with the side of the box of safety matches. This ignites the head of the match which instantly lights the powder core of the fuse. If a "strike anywhere" match is used, the same procedure may be followed, using a smooth, dry stone instead of the match box to light the match.

Handling Blasting Caps

However, lighting the fuse properly is not the only thing to be learned about the safe and effective use of dynamite. When the proper length of fuse is cut off—and a good rule to follow in this is to use never less than 3 feet, which gives from 1½ to 2 minutes to get away, and always enough to project from 6 to 8 inches from the mouth of the hole—the fuse should be cut off square with a clean knife (a sharp pruning shears is one of the best implements for cutting fuse) so that the square end of the freshly cut fuse comes in contact *gently* with the explosive charge in the blasting cap. It is not enough to just put it into the blasting cap; the blasting cap must be crimped or held on the end of the fuse. This is best accomplished by the

aid of an implement made especially for the purpose, called a cap crimper, and this crimp should be applied near the open end of the cap. The use of a jack knife for making this crimp is never very satisfactory, neither is it healthy to crimp the cap with the teeth. If a cap crimper is not available, a pair of flat nosed pliers may be used to pinch the open end of the cap in such a way as to make an imitation of the flat sleeve crimp. If the bore hole is wet the cap should be smeared with soap so water cannot enter the cap.

After this operation has been performed satisfactorily the next step is to insert it into the dynamite cartridge. This is done by making a hole about as big as a lead pencil, either in the end of the cartridge or in the side, taking a piece of string about 18 inches long, or if tar binding twine is available, it makes a very excellent way of holding the cap and fuse firmly in the dynamite cartridge. The twine should be doubled over and a hitch taken on the fuse a few inches above its entrance in the dynamite cartridge and the two free ends tied firmly around the dynamite in such a way that a sharp jerk will not result in pulling the cap out of the dynamite. The blasting cap itself should lie as nearly as possible in the axis or center of the cylinder of dynamite, whether the hole to receive the cap is made in the end or in the side. The hole in the side should be made so as to avoid any possibility of the closed end of the cap protruding from the opposite side of the cartridge.

After the primer is properly made, it is generally advisable that it be loaded either the last cartridge in the hole or next to the last. A wooden stick only should be used for loading and tamping. High explosives are so quick and powerful in their action that some people consider it unnecessary to stem these charges so that they are well confined, but any explosive should be carefully and thoroughly stemmed and tamped, not only from a safety standpoint but in order to develop their full strength. The best materials for stemming are moist sand, clay or loam. The greater the confinement, the more work the dynamite will do—and if the priming has been done carefully and the fuse lighted in the proper manner, the dynamite will certainly explode.

Another reason for the use of inert stemming on top of the charge is that fuse comes in coils and is rather stiff, and it has happened that in untamped shots, the fuse, the minute it is released from the hands of the operator, curls around and spits directly into the hole on the dynamite which sets the dynamite on fire and it may explode immediately or may burn until it reaches the cap. This is a frequent cause of accidents as is also the failure to light the fuse at the time when it was intended, with the result that the operator returns and attempts again to light the fuse when it has been lighted already, causing the operator to think that the fuse has burned faster than it should have, that it has flashed or run. The standard makes of fuse burn at the rate of between 30 and 40 seconds to the foot. Therefore 3 feet of fuse will give a minute and a half to two minutes for the operator to get away, after the powder core is actually lighted, and almost anybody can run a considerable distance in this time. It is well to bear this in mind—that modern, standard fuses cannot be made to flash or burn instanteously unless they have been subjected purposely to exceedingly rough treatment, such as pounding them on an anvil, so as to entirely break up the confining threads, tapes and waterproofing.

FURTHER DETAILS ON THE USE OF EXPLOSIVES

Detailed and explicit directions for the use of explosives are always available from manufacturers and can be had for the asking, and any contractor will certainly get his money's worth out of a three cent stamp addressed to the dynamite manufacturer, in return for which he will get a leaflet, book or some other instructions which will insure the successful use of this most useful substitute for hard labor.

Enlarging a Creek Channel to Prevent Flooding

(Continued from page 26)

man set 75 feet back. The log was 30 feet long by 3 feet in diameter and was buried 7 feet in the ground. In starting to pull against this the heavy chain of a Marion 60 steam shovel was snapped. The final pull exerted to get the shovel out was about 360 tons. The Northwest crane was used pulling against the dowels in the rock and two Caterpillar Sixties against the dead man.

UNDERPINNING A BRIDGE

In the widening process it was necessary to underpin the 7th Street, S W, bridge as the creek bed was lowered at that point about 4½ feet. As the creek was low below the bridge, a mud dam was thrown up and the water pumped around the bridge during the work. The bridge was supported to rock on timbers and then one column was poured at a time until the entire structure was carried down to the new rock elevation.

While visiting this work a novel piece of underpinning was noted which absolutely prevented the concrete shrinking and leaving a slight crack between the old and new concrete. Instead of trying to pour the concrete just up to the elevation of the old column base the forms were carried up about a foot above the base of the old column and the concrete poured up to that height. Thus an old foundryman's trick was used to insure that the concrete was poured and set snug against the old column.

PERSONNEL

The contractor for this section of the Valley Creek widening project was Christie, Hutchinson & Burton Co., Inc., of Birmingham, Ala. Earl Burton, Vice President of the corporation, was in charge of the field work. For the Engineering Department of the City of Birmingham, E. M. Owen was Resident Engineer.

Editorial Note: The first illustration in this article was furnished through the courtesy of Peterson & Simmons, Fairfax, Mo.

"Protecting Profit in Bad Weather" is the title of a helpful article discussing ways and means of avoiding losses on out-of-door construction work resulting from bad weather, which will appear in the June issue of CONTRACTORS AND ENGINEERS MONTHLY.

A Well-Run Grading

and

Top Soil Job

Blythe Bros. Co.,

Charlotte, N. C.,

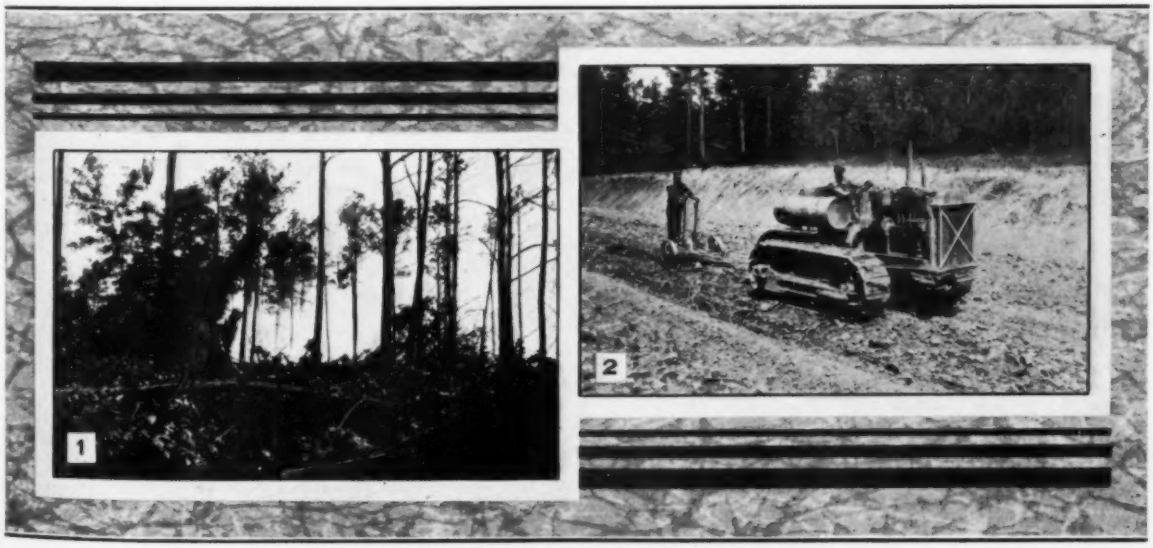
Built

4.82-Mile Road

STATE Route 19 running west from Richmond, Va., was improved by 10 miles of relocation during the spring of 1932. One section of this work, which was started early in February, was handled by Blythe Bros. Co. of Charlotte, N. C. Work was started about 1½ miles from the west end of the job and continued to the east; then, in the opposite direction from the same point, working through to the west terminal of the project.

Excavation was handled by a Lorain 75-A shovel with a Waukesha 84-horsepower motor served by six Hug trucks owned by J. E. Dooley Co., Elkin, N. C., and also two new 6-cylinder Autocars with dual pneumatics. The clearing and grubbing was subbed and about fifteen men kept the right-of-way open ahead of excavation. Cobb & Homewood of Chapel Hill, N. C., had built all of the drainage structures under a subcontract. These included one 90-foot bridge, one box culvert and about 80 headwalls for pipe culverts.

The cuts ran up to a maximum of 18 feet in depth with some of them as much as 500 feet long, the largest



PREPARING THE GRADE FOR THE TOP SOIL

1. *Clearing and grubbing through the pines.* 2. *Virginia specifications require that all compacted grade be broken up with a scarifier before the gravel top is spread.*

being 1,000 feet long. The small amount of rock drilling required was handled with a Worthington portable compressor and Chicago Pneumatic jack hammers, drilling holes to a maximum depth of 6 feet in the sandstone. Du Pont 40 and 60 per cent dynamite was used for the blasting. Cuts and fills were well balanced within 300 to 400 feet but there was one maximum haul of 2,000 feet to fill. Fills were mostly of small height with a maximum of 20 feet and they ran from 600 to 700 feet in length.

There was one continuous stretch of 4 miles of muck which caused considerable trouble. In dry weather it would have been an easy job to handle but the early spring rains were practically continuous and in order to make progress it was sometimes necessary to run the outfit as long as 18 hours a day. Eight Oxweld acetylene carbic lights were used to light up the roadway and the shovel was equipped with a carbic light.

The fills were built in 12-inch layers and rolled with a 12-ton Acme 3-wheel gas roller. The trucks were all end dump and the piles of fill material were pushed over the edge with a Caterpillar Sixty equipped with a new Baker bulldozer. There was only one man for hand work on the dump and the tractor driver for the bulldozer.

GRAVELING

The contractor used nine different pits distributed over the length of the job so that there was no overhaul. This was particularly important on this job as the 1932 Virginia Department of Highways specifications require that all haul be included in the unit price for the material. A crew of five men cleared various knolls for the gravel pits. The gravel used on this job was a top soil material interspersed with some small stone. The largest gravel pit was about 10 acres in extent and was stripped to a depth of 18 inches to furnish top material for about 1½ miles of road.

The gravel was laid down 14 inches loose and rolled to a 10-inch compacted layer. Four men were used in hand labor in spreading and a Caterpillar Thirty with an Adams 10-foot blade grader as well as a Caterpillar Sixty with a 12-foot Austin blader was used to spread the gravel. Where the base had become too hard or was a bit high for the grade it was broken up with a Wiard scarifier pulled by a Caterpillar Sixty, leveled to grade and then the gravel top spread.

PERSONNEL

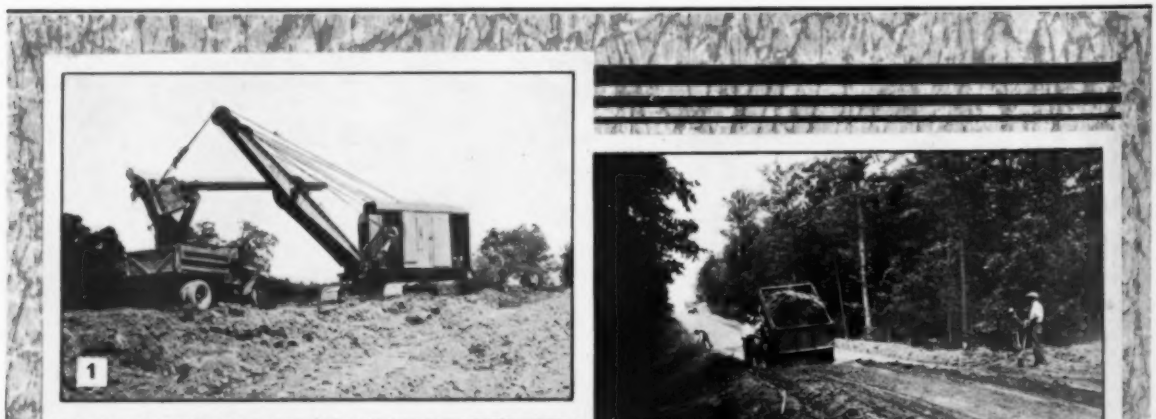
This 4.82-mile project was built 20 feet wide with 6-foot shoulders on fills and 5-foot shoulders in cuts and was completed by Blythe Bros. Co., Charlotte, N. C., on June 25. C. E. Blythe was in charge of the work for this company with E. W. Crowder as Superintendent. C. W. Stagg was Resident Engineer for the Virginia Department of Highways.

The Baltimore Water Tunnel Under City Streets

(Continued from page 17)

on the new water tunnel has been handled by the Bureau of Water under the direction of Bernard L. Crozier, Chief Engineer, Department of Public Works. Leon Small is Water Engineer and J. S. Strohmeyer, Distribution Engineer, in charge of the work for the Bureau. John J. Hunt was Resident Engineer in the field. Prof. John H. Gregory was Consulting Engineer on the project for the Public Improvement Commission, a non-partisan, unpaid commission of public spirited citizens appointed by the Mayor and responsible to the taxpayers for the economical handling of all construction under the direction of the city.

The contractor for this water tunnel was the Whiting-Turner Construction Co. of Baltimore, Md., for whom Charles J. Conners was Superintendent until his death in an automobile accident. He was succeeded by Robert Parker as Superintendent. L. Wilhelm was Superintendent for the Lock Joint Pipe Co. of Ampere, N. J., in the local construction of the reinforced concrete pressure pipe with which the tunnel was lined.



LOADING AND DELIVERING THE GRAVEL TOP

1. *The top soil from a perfectly good orchard was stripped for the gravel top.* 2. *Dumping the gravel from the tail-gate of one of the fleet of dual-pneumatic-tired trucks.*

The Editor Comments

Keep Up Your Morale

In discussing the business situation among contractors, with another of our many friends among contractors, he painted a picture of the way in which he is keeping up his morale in spite of the fact that even small jobs are exceedingly scarce. This general contractor has handled a good many $100,000 jobs, many of them running at the same time so that he has had numerous outfits in the New York metropolitan district working on widely differing problems.

Jobs became so scarce that in January he had but one outfit running and, in February when his lease expired, he gave up his downtown office and moved his office telephone number to his yard where he and his office man built a well-insulated, workman-like and small office. His assistant commented, "There has been so little to do in the office for so long that it seems good to be doing something. It has boosted my morale a lot."

That's the fighting spirit that is existing in a great many small and large contracting organizations today. May everyone of them soon find plenty of real work to do instead of merely building for morale.

Bid Price $1,960, Bond $3,000

An interesting example of present-day topsy-turvy condition of prices is found in the bids recently received by the Department of Water Supply, Gas & Electricity of New York City for driving piles in Broad Channel, Jamaica Bay, Long Island. The work to be done consisted of furnishing, delivering and driving 8 pile clusters, totaling 60 piles, with an estimated length of 4,000 feet. The specifications required piles 14 inches in diameter at the butt and 6 inches at the point and the price bid per linear foot included cable lashings. Nine bids were received by the Department on February 14, 1933, varying from 49 cents per foot to 89 cents per foot or from a total of $1,960 to $3,560.

The engineer's estimate for this contract was $6,000 and was intentionally somewhat liberal due to the fact that the work was to be done in the late winter, the character of the work, and the desire to avoid the necessity of a possible resubmission of the contract to the Board of Estimate and Apportionment if bids were not within the amount previously approved by the Board. The Department required surety of $3,000 and a time limit of twenty consecutive working days was set for the job which was to be started as soon as the contract was certified. The low bidder is a responsible contractor respected by his competitors, one of whom said frankly he could not do the job for 49 cents a foot himself but was willing to bet that the other man would finish the job satisfactorily.

It is seldom that a contractor is required to furnish a surety bond 50 per cent in excess of his bid price. The conditions set up by the Department of Water Supply, Gas & Electricity and the location of the job in almost open water where a unheralded storm might mean complete loss of equipment partially explain the unusual relationship of estimate, bid and surety.

Safety on an Oil Drum

One of our contractor friends confessed, a couple of weeks ago, that he had flagrantly violated safety regulations of his own making and for the violation of which he would have fired any man he caught on any of his jobs. The confession was brought forth by a sympathetic inquiry as to the cause of an injured hand.

Friend Contractor was just doing a little odd job around a construction shanty and, there being no ladder handy, stood on an oil drum to reach high enough to drive a nail. Result—the oil drum rolled out from under him just as he was taking the first crack at the nail and he hit his own hand instead of the nail.

Moral—Mind your own safety regulations. Stand on firm ground and hit the nail and not the hand.

Diesel Power Is Here

In May, 1930, pages 67-71, we published an article, "The Present and Future of Diesel Engines for Construction Equipment." While optimism as to the future of the diesel engine in the construction field prevailed generally, the actual use of this type of economical plant in the construction industry was more or less in the experimental stage. In the January, 1931, issue appeared an article, "Diesel Engines on Construction Work" by R. E. Swinney, Swinney & Coleman, Port Allen, La. Mr. Swinney reported most favorably on the use of diesel engines on his draglines which worked 23 hours a day.

What is the picture today? One of the leading tractor companies reports increasing sales of its largest tractor which is powered with a diesel engine. Shovel, crane and dragline manufacturers all talk "diesel" as power for their machines. Power graders are now equipped with diesel engines and practically every manufacturer inserts in his catalogs "electric, gasoline or diesel power."

Theodore Reed Kendall

How the Other Fellow Did It

Ideas That Have Already Proved Helpful to Contractors

A Dumping Trap for Bulk Cement

226. A Minnesota contractor who had a cement dock, built to handle two cars at a time and measuring 38 feet long by 10 feet wide, had a rather effective dumping trap for the cement buggies. The dumping traps were of wood with a platform for the buggies to run out on and were counter-balanced and hinged at the dock end. A U-shaped heavy rod was fixed to the outer end of the trap to form the dumping hole and behind that there was a lighter rod from which a canvas flap was suspended. When dumping, the wheels of the carts dropped into the opening formed by the first heavy rod. Then the lip of the cart struck the platform and also the outer end of the rod, thus cleaning the cement thoroughly from the cart. The traps were raised and lowered to clear the cabs of the trucks as they drove through. 24.1.54

A Master Steel Straight-Edge Is a Good Investment

227. Contractors who use wooden straight-edges for checking the surface of the new concrete will find that a master steel straight-edge, carried on the paver or finishing machine or a trailer pulled by the finishing machine and used as much as five times a day for checking the wooden straight-edges, will be a good investment. The wooden straight-edges which are being soaked in the grout on top of the pavement and then laid on the shoulder to dry warp quickly and particularly if the warping occurs in a plane vertical to the pavement, erroneous checking will result. This means the contractor will have to take out a lot of bumps in the concrete after it has reached its final set. In checking a wooden straight-edge, red crayon is usually rubbed along the entire length of the master straight-edge and then the wooden straight-edge is rubbed across the master. If there are places where there are no crayon marks on the wood, it shows that the parts which are crayon-marked are high and the jack plane is immediately called into action to true up the wooden straight-edge. 24.1.55

Special Pins for Wood Forms on Asphalt Paving

228. On most hot-mix asphalt jobs, wood forms of 2 x 4's or 3 x 6-inch planks are used. These are held in place by pins which in most cases are driven through holes previously bored in the forms. An Ontario contractor obviated the necessity for weakening the forms with these holes by using pins bent over at the top. The forms on this particular job were 3 x 6-inch spruce in 16-foot lengths and three or four ¾ x 15-inch iron pins were used, bent over 1½ inches at the top and driven down onto the forms. 24.1.78

Spraying the Bodies of Hot-Mix Trucks

229. It is necessary to spray the sheet metal bodies of trucks hauling hot mix several times a day in order to prevent the batches from sticking. One contractor whose job we visited had the trucks sprayed every three or four trips. A novel device to speed up this process was set up next to the drive where the trucks backed in under the batch box. A vertical tank of about 60-gallon capacity with a glass gage held the fuel oil and a tap on the air line to the asphalt kettle provided pressure for spraying the oil into the bodies. In cold weather the bodies were sprayed more frequently. 24.1.81

A Method of Handling 50-Foot Rock Cuts

230. A Pennsylvania contractor working in West Virginia had cuts as deep as 53 feet. In drilling these, he used 12-foot rods with detachable bits and the rock was taken off in benches instead of working the full depth with blast hole drills. It is the usual practice in West Virginia to shoot the slopes in rock cuts after the full depth of the cut has been made. This contractor, however, trimmed the slopes as the various lifts were shot and thus, when the bottom of the cut was reached, there was no more shooting and rock to be handled. Usually he left a small amount of earth excavation at the ends of the rock cuts to be loaded and brought into the cut and bladed over to give a cushion on the rock and thus furnish a better grade for the finished road. A motor-patrol grader was used for the grading. 24.1.65

Do You Protect Your Aggregate Bins with a Grizzly?

231. It is becoming increasingly common for contractors to place some kind of a bar grizzly on top of the aggregate bins above the batchers to keep out rags and timbers which may have been inadvertently picked up by the clam-shell in unloading gondola cars. We have mentioned this before, but have just noted a 3 x 5-inch mesh grizzly made up of rods used over a coarse aggregate bin which has proved very successful. Particular care must be taken that the grizzly is fixed firmly to the edges of the bin so that there will be no chance of any rod or other sections of the grizzly dropping into the bin and temporarily disabling the batcher. 24.1.53

Are Your Expansion Joint Dowels Always Horizontal?

232. Even with the strictest inspection and the best intention on the part of the contractor, careless laborers will not infrequently step on or otherwise displace the horizontal dowels which are required in many state specifications through the expansion joints to bond adjacent slabs. Specifications call for various kinds of chairs or that the end of the tin tube which surrounds one end of the dowel shall be bent down to support the dowel properly. One contractor who is determined that the dowels will be where they are supposed to be has developed an angle iron frame which fits over the forms and holds the dowels accurately in place. It further acts as a barrier immediately around the expansion joint so that none of the puddlers or steel men who may be working in that vicinity have an opportunity to misplace the dowels. The particular frame which was being used in a state which required six dowels was a twelve-legged device composed of two equal-leg 1½-inch angles 10 feet long with three 2¼-inch straps bolted to them to space the angles which held the upright prongs which define the position of the dowels. The straps were riveted or welded to the horizontal legs and the prongs to the upright legs of the angle irons. The prongs were formed of 3 x ¼-inch strap iron notched at the bottom to fit the dowels and at the proper elevation to hold the dowels firmly. On the undersides of the horizontal straps were two pieces of angle iron with the vertical legs close enough to fit over the metal cap of the expansion joint. These three sets of short angles lined up the device so that every part functioned properly. Every few joints and whenever the men had a few free minutes, they cleaned the concrete from the "straddler" as they called it, with their concrete spaders, and oiled it. Thus at all times the device was accurate and ready for immediate use. 24.2.19

Legal Points for Contractors

These brief abstracts of court decisions in the contracting field may aid you in avoiding legal difficulties. Local ordinances or state laws may alter the conditions in your community. If in doubt consult your own attorney

Edited by A. L. H. Street, Attorney-at-Law

The Major Risk of Minor Employment

The contractor who consciously violates a labor law forbidding the employment of minors under a certain age may feel that the only legal risk he takes is the hazard of being prosecuted for the violation, with a good chance of getting off with a small fine. If he does so cogitate, he is seriously mistaken. Every minute the minor is at work involves a virtual guaranty on the part of the contractor that no harm will come to the youthful worker. If the minor be injured, proof that he was illegally employed is all that is needed to fix liability upon the employer. It will be no defense that the contractor was not at fault as to the direct cause of the accident.

The reason why the courts take the position above summarized was thus stated by the Montana Supreme Court in the case of Daly v. Swift, 300 Pac. 265, decided May 20, 1931:

"The controlling thought . . . is the preservation of our children from injury or death, that they may reach the status of manhood and womanhood still possessing all of their members and faculties, and may become useful citizens, and, in addition thereto, the humanitarian purpose of this section and the next succeeding one, imposing a correlative prohibition upon the parents of such children under like penalties (section 3096), is to prevent commercial exploitation of minors of tender years to their detriment and loss of childhood's birthright of carefree enjoyment of life and liberty. It is well said that 'the interest which the state has in the physical, moral, and intellectual well-being of its members warrants . . . the exercise of every just power which will result in preparing the child, in future life, to support itself, to serve the state, and, in all its relations and duties of adult life, to perform well and capably its part.' . . .

"Therefore a violation of the statute, though merely penal, forms the basis of an action for damages for injuries resulting from such labor as the employment entails, and the general rule [is] that the violation of a statute enacted for the protection of the public is negligence."

Penal Statutes Must Be Strictly Construed

A conviction of having presented to the Evansville Board of Public Works a false and fraudulent claim under a sewer construction contract was reversed by the Indiana Supreme Court in an opinion handed down June 11, 1931, in the case of Pontarelli v. State, 176 N. E. 696. It was decided that a presentation of a claim to the city's attorneys, who prepared a resolution containing provision for payment to the contractor, was not such presentation to the Board of Public Works by the contractor as to bring the case within the Indiana statute, penalizing the making of a false and fraudulent claim to the board. Said the court:

"The resolution adopted by the Board of Public Works, . . . and which contained an itemized list of the various amounts due appellant, was dictated and prepared by the attorneys for the City. The only paper prepared by or on behalf of appellant that was ever filed or presented to the Board of Public Works of the City of Evansville, as disclosed by the record in this case, was an affidavit by appellant which was to the effect that the work had been completed according to contract; and it is not contended nor relied upon by the state as being a claim within the meaning of the statute under which appellant is being prosecuted."

Applying Payment Where Several Accounts Exist

Where a contractor owes several different accounts to the same creditor and makes a single payment, he should remember that he has a right to direct which particular account shall be credited. If he fails to indicate how the payment is to be applied, the creditor may choose the account to be credited. Direction as to which account is to be credited may be made by the debtor on the check itself, or in a separate letter, or by word of mouth. The particularly cautious contractor is apt to make both notation on the check and also in an accompanying letter.

The right of a creditor to choose the account to be credited, where the debtor has "passed," was lately recognized by the St. Louis Court of Appeals. (43 S. W. 2d, 894.) The suit involved the application of a payment made by a builder where he was indebted on several different accounts for materials.

Necessity, Not Convenience, Makes Sunday Labor Lawful

It may be lawful to "pull your ox out of a pit on Sunday," but it is not lawful to dig the pit that day, according to the decision filed February 23, 1931, by the Springfield, Mo., Court of Appeals in the case of State v. Coffee, 35 S. W. 2d, 969.

Defendant was fined $10 for working men on Sunday on an electric high line, and appealed on the ground that this was a work of "necessity," and therefore not unlawful under the Missouri statutes. Said the court:

"The jury might have determined that the 'necessity' had existed for some time and might have been anticipated before it was, or that additonal men could have been employed to rush the work and thus avoid Sunday labor. It may have been more convenient to do the work on Sunday or during the dry season, but convenience is not the criterion."

Assault as Injury Received in Course of Employment

Because a highway contractor's under boss would not punch a truck driver's ticket because of his failure to follow instructions in dumping gravel, the driver punched the under boss. That is what gave rise to the case of Correia v. McCormick, 154 Atl. 276, decided by the Rhode Island Supreme Court April 15, 1931.

The point litigated was whether or not the injury so received by the under boss was compensable under the Workmen's Compensation Act, as having arisen out of and in the course of the employment. Answering that question in the affirmative, the court said:

"The direct cause of the petitioner's injury was his strict adherence to duty. He merely complied with the orders given him by his superior. There was no evidence that at the time he received the injury he had stepped aside from his employment to engage in a private quarrel. He repeatedly told the driver to go to the boss. This the driver refused to do, and from the testimony it appears that at the time the assault occurred the petitioner was on his way to report the trouble to the boss. Had the petitioner punched the ticket, giving the truck driver credit for a load dumped in violation of orders, there would have been no assault and no injury."

Construction Industry News

Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill., has announced the election of Neil C. Hurley as President of the company succeeding Ralph S. Cooper, who has been named Vice President in charge of eastern operations of the firm with headquarters in New York. John A. McCormick was reelected Chairman of the Board and Leonard S. Florsheim was named Chairman of the Executive Committee. Frank B. Hamerly was elected Vice President in charge of the factory at Aurora, Ill., and Gordon H. McCrae, 40 Broadway, London, England, Vice President in charge of foreign business. F. W. Buchanan was named Secretary and Edward G. Gustafson, Treasurer.

American Institute of Steel Construction, 200 Madison Ave., New York, N. Y., has lost through death its Chief Engineer, Lee H. Miller of Cleveland, Ohio. Mr. Miller died on April 9 following a major operation. He was one of the founders and former Managing Director of the Institute.

Hunter Tractor & Machinery Co., a Wisconsin corporation, has been formed by Morton R. Hunter who is President and Sales Manager and William M. Thompson, formerly Treasurer of the Hokanson-Thompson Co., Treasurer. The salesmen include Harvey Burtnett, Andy Crowley, Bud Uebele and Mann E. Wagler, formerly with Hunter Machinery Co. This new company has leased the Milwaukee plant of the Hunter Machinery Co., located at 327 So. 16th St., and also the Madison plant direct from the owner, Theo. Kupfer, at 627 E. Mifflin St., Madison, Wis. The company will represent a list of high grade lines with which the name Hunter has been constantly associated during the past seventeen years, including Caterpillar Tractor Co., Chain Belt Co., Clyde Sales Co., Bucyrus-Erie Co., Blaw-Knox Co., Burch Corp., E. D. Etnyre & Co., Euclid Road Machy. Co., LaPlant-Choate Mfg. Co., St. Regis Paper Co., and Sullivan Machinery Co.

Western Material Co., Sioux Falls, N. D., has recently taken over the Central Tractor & Equipment Co., of Sioux Falls as well as the Rapid Tractor & Equipment Co. of Rapid City, S. D., and the Interstate Equipment Co., of Aberdeen, S. D.

The Speeder Machinery Corp., Cedar Rapids, Iowa, manufacturer of Speeder shovels, cranes, draglines and trailers, has appointed the H. O. Penn Machinery Co., 140th St. and East River, New York, N. Y., as its dealers in the New York metropolitan area and New Jersey for ⅜ and ½-yard sizes.

Republic Steel Corp., Youngstown, Ohio, has announced the closing of its Dallas, Texas, district sales office and its removal to 2322 Gulf Bldg., Houston, Texas, in charge of R. E. Lanier, District Sales Manager.

The Central Foundry Co., 420 Lexington Ave., New York City, has announced the removal of the Chicago sales office of its Universal Pipe Division on May 1 to 1629 Wellington Street, corner of Paulina Street, Chicago, Ill.

Wisconsin Motor Corp., Milwaukee, Wis., is not located at Waukesha, Wis., as erroneously reported in our April issue where the announcement of the change of name of the company appeared.

Worthington Pump & Machinery Corp., Harrison, N. J., has recently opened its new office building adjacent to the corporation's plant at Harrison, N. J. The general and executive offices, formerly situated at 2 Park Ave., New York City, have been moved to the new location for better coordination with manufacturing and sales operations. The local sales office will, however, be continued at 2 Park Ave.

Morris Machine Works, Baldwinsville, N. Y., has announced the removal of its New York office to 254 West 31st Street, New York City.

Anderson Equipment Co., 616 Merchants National Bank Bldg., 13th and Farnam Sts., Omaha, Nebr., has been organized by A. C. Anderson, President, who for four years was connected with the Fuchs Equipment Co. and prior to that was Sales Manager for Brown-Bevis Co., Los Angeles, Calif. This new company will handle National Equipment Corp. shovels, cranes, pavers and mixers; Barnes Mfg. Co. pumps; W. A. Riddell Co. graders; Le Roi Co. engines and compressors; Independent Pneumatic Tool Co. air tools; Drake-Williams-Mount dragline buckets; Insley Mfg. Co. shovels, cranes and concrete handling equipment; Deming Co. pumps; Metal Forms Corp. road and street forms; The Hayward Co. clamshell and orange peel buckets; Macwhyte Co. cable; American Manganese Steel Co. pumps; Atlas Powder Co. dynamite; Vulcan Iron Works pile driving equipment and Sasgen Derrick Co. winches and derricks.

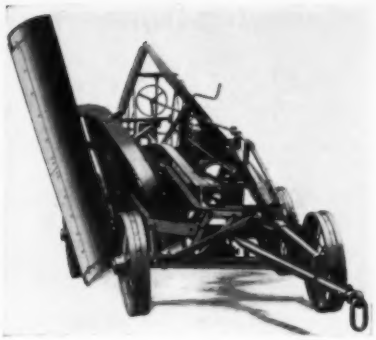
Chain Belt Co., Milwaukee, Wis., has announced the appointment of the Blaisdell-Folz Equipment Co., 219 W. Pearl St., Cincinnati, Ohio, as its representative for the complete line of Rex construction equipment.

Dow & Co., Inc., Court and Wilkeson Sts., Buffalo, N. Y., is the new name of Dow-Potter Co., Inc. This company maintains its office and warehouse at the above address and is exclusive distributor in the Rochester-Buffalo-Jamestown area of New York State for Walter Motor Truck Co., Carl H. Frink, International Harvester Co. of America, industrial tractors, Rome Mfg. Co., Ames Iron Works, Hanson Clutch & Machinery Co., Mohawk Asphalt Heater Co., C. H. & E. Mfg. Co. and Rodax Corp. This company also handles a full line of tractor equipment and road building accessories. N. A. Coulter, formerly of Lewis & Coulter, Pittsburgh, is now associated with this firm.

A More Equitable Basis for Mechanics' Liens Provided

A MORE equitable basis for liens against real property by laborers, persons who furnish materials, subcontractors engaged in building construction and related work and others is provided by the Uniform Mechanics' Lien Act just published by an Advisory Committee of the Department of Commerce, working in cooperation with the Division of Building and Housing of the Bureau of Standards. Completion of the Act by the committee which was appointed in 1925 by President Hoover, while he was Secretary of Commerce, marks a forward step in legislation of this kind, according to the committee's report to the Secretary of Commerce recently announced by the Department.

The Uniform Act provides for an informal procedure, which conforms largely to modern business practice in the construction industries, in order that the parties involved may adjust any difficulties that may arise without resort to the public record. A lien action is not a friendly act and its avoidance is advantageous to all parties through the saving of expense, delay and annoyance, the preserving of business reputation, and keeping titles clear of lien clouds.



The New Adams No. 112 Leaning Wheel Grader

A New High-Lift Leaning Wheel Grader

THE new Adams No. 112 high-lift leaning wheel grader is of medium weight and moderately priced, for a 12-foot blade machine. It fills the requirements of the highway official or contractor who does not need a combination scarifier-grader and whose work is not continuously in rocky or otherwise difficult territory. This machine, made by J. D. Adams Co., Indianapolis, Ind., may be fitted with a scarifier for occasional work by removing the moldboard. Back slopers of flat bottom or V type are also available.

A wide range of blade adjustments is made possible in this machine by an arrangement in the drawbar hinge connection at the rear of the blade circle. By simply pulling a locking pin, the drawbar and blade can be swung outward either to right or left for bank cuts or a wide reach outside the line of the wheels. The center hole is used for normal grading and ditching. Adjustment from one position to the other requires but 2 minutes time. By means of this adjustment the 12-foot blade can be set to cut a bank 6½ feet high and 73 degrees from the horizontal. It also permits cutting outside the line of the wheels 6½ feet with the regular blade for finishing shoulders or 9½ feet with a simple moldboard connection.

The general design of the No. 112 is essentially the same as the No. 12 which has been used generally for fourteen years. The improvements are in all-welded construction, providing greater strength, a new and stronger drawbar of H beams and a new blade circle and reversing ring design, which gives the blade more rigid support. All gears are machine cut and enclosed, all bearings are machine-finished and adjustable for wear and the wheels are fitted with anti-friction bearings. The power recommended for its use is a tractor with 40 or 60 drawbar horsepower. The overall length of the machine is 32 feet 2 inches, overall width 9 feet 10 inches and the approximate weight 7,750 pounds.

Roller Bearing Rock Crushers

ROLLER bearing rock crushers designed and constructed to produce the smallest grades of crushed stone in large quantity and at low cost per ton are made by the Monarch Manufacturing Co., Inc., East Front St., Wilmington, Del. When used for reduction purposes only, the coarse materials from primary breaker or storage bin are fed direct and automatically to these crushers. The Monco crusher also serves as a dual purpose machine. Owing to its large feeding mouth, one-man rock may readily be fed to these crushers and reduced in one operation to the smaller grade.

To accomplish the reduction of the hardest rock to small sizes, these machines are built of specially selected and tested steel, with the eccentric shaft and moving jaw equipped with self-aligning roller bearings. The eccentric shafts are of chrome vanadium forged steel. Long moving and stationary jaws insure large tonnage in the smaller sizes and fines, with comparative larger tonnage when jaws are opened for producing the larger sizes.

The 10 x 28½-inch crusher has a capacity of from 16 to 35 tons per hour, and the 10 x 40-inch crusher 22 to 50 tons per hour. Both crushers operate at 320 rpm to obtain the best results. They weigh 11,000 pounds and 14,500 pounds respectively.

A Compact Air-Cooled Engine for Contractors

A COMPACT standard engine of rugged construction, which starts easily and is built to stand the gaff of operation on construction projects and which is air-cooled, has been announced by the Wisconsin Motor Corp., Milwaukee, Wis. It is made in several sizes ranging from 2 to 6 horsepower and is of the single-cylinder 4-cycle type. The rotation of the engine is counter clockwise facing the power take-off shaft. Cooling is effected by a large fan cast in the flywheel which supplies a strong blast of air around the cylinder and head. The engine is lubricated by a pump-circulated splash system with the oil pump in the engine base operated from the camshaft. These engines are regularly furnished to burn gasoline, but can also be furnished to burn kerosene or fuel oil of a gravity of 38-42 Baume test.

Ignition is with a high tension magneto with impulse coupling. An air governor, operated by air blast after it leaves the housing, is fully protected and requires no oiling or adjusting. The carburetor which is equipped with an automatic choke is designed for easy starting and economical performance. The manufacturer recommends equipping these engines with air cleaners of either the dry or oil-bath type which can be furnished for all models at slight additional cost. A clutch take-off assembly complete with shifting mechanism can also be furnished for all models at additional cost. The contractor can also secure speed reduction drives of spur gear or internal gear types.

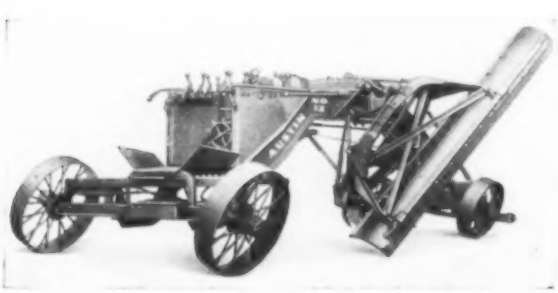
One of the Small Wisconsin Air-Cooled Single-Cylinder Engines

A New Power-Controlled Grader

HYDRAULIC power control for graders provides faster, smoother and easier means of leaning wheels, shifting the rear axle, and operating the blade, pole steer and scarifier. The Austin-Western Road Machinery Co., 400 No. Michigan Ave., Chicago, Ill., has recently announced the new Austin No. 12 grader with hydraulic power control. It carries a heavy 12-foot blade with railroad rail reinforcement, cuts 18 inches below ground level, has a high reach of 7 feet 10 inches and can be raised into high lift position in less than 3 minutes.

A rotary pump actuates the rams that work within double-acting, high-pressure cylinders to move the various parts. The pump rotates constantly, but does not operate under load or against the relief valve when the blade, wheels, etc., are in locked position. Both ends of the blade can be lowered or raised individually or simultaneously.

Other features of construction include a one-piece girder-type frame of welded construction which permits a greater high-lift angle and better view of the working blade. The wide-reach, telescopic blade-lift arms have finished ball and socket joints. The Z-bar draft beam has a ball-joint connection and a special lowering device so that the line of draft is straight and direct and no power is applied through the frame.



The Austin-Western Hydraulic Power-Operated Grader Showing the Blade at a High-Lift Angle

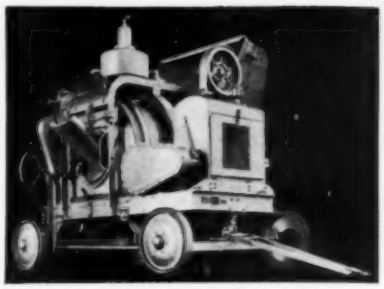
The engine hitch with a universal-joint draft connection can rise or fall 44 inches from normal position. The extra large diameter, one-piece cast steel circle is accurately machined for smoother operation. The axles have over-size drop-forged spindles, and are equipped with tapered roller bearings. The built-up front end of welded construction is flexibly designed to permit either front wheel to operate 36 inches above the other. The simplified rear end, using high carbon steel angles, provides 20 inches of ground clearance.

A New 10-S Drum-Type Mixer

A NEW 10-S mixer which is lower, narrower and lighter has been announced by the Construction Machinery Co., Waterloo, Iowa. This Master 10-S mixer has anti-friction bearings throughout and the drive is effected through a high-speed roller chain running over machine-cut sprockets in a bath of oil and the shafts are self-aligning.

The application of automotive steering is used which, combined with full spring mounting and roller bearing wheels either steel or rubber tired, make this mixer a good trailer. It is constructed of steel wherever practical, electric welded, hot riveted and bolted into a rigid unit. The controls are conveniently located at the end of the mixer for handy one-man operation. Alemite-Zerk lubrication is used throughout.

The Accurmeter calibrated water tank with a dial indicator showing both pounds and gallons, and with an improved Duo-Phase valve, is standard equipment. This tank will split a pint and the valve is non-bypassing. A new timing device, the Mixometer, is available for jobs requiring this equipment.



The Master 10-S Mixer

A Combined Drag and Checking Straight-Edge for Concrete

THE use of a 10-foot straight-edge by the finishers to spot irregularities in freshly poured concrete is essential. Some times a slight excess of moisture exists or some laitance shows up which should be dragged from the surface. The use of a checking straight-edge for this purpose is liable to prove disastrous to the accuracy of the tool. To overcome this the L & M Manufacturing Co., 10276 Berea Road, Cleveland, Ohio, has developed the Giant-GripT straight-edge designed by a practical road man which will do both jobs without affecting the accuracy of the checking straight-edge. The straight-edge, built all of steel, has a 10-foot handle and 10-foot blade of steel tubing with a drop forged steel connector, the whole weighing only 10¼ pounds. The Giant-GripT connector is a drop forging designed to give great strength and yet is light in weight. It is permanently attached to the handle of the straight-edge and is so built that the straight-edge can be assembled in about two minutes. The checking blade is inserted in the connector, two bolts are slipped through the jig drilled holes and tightened up. The straight-edge has a square flat side for dragging and a circular side for checking, as shown in the illustration.

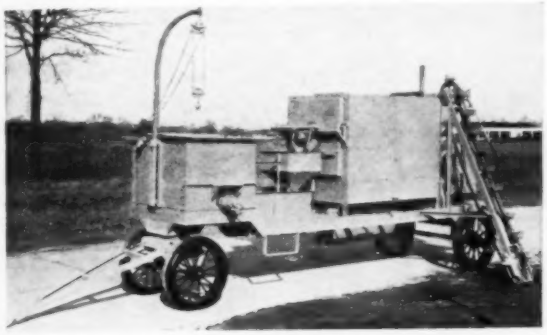
The Giant-GripT Straight-Edge with the Blade in Position for Dragging

At Right, the Blade in Position for Checking

A Street and Highway Repair Truck

A NEW model street and highway maintenance machine for state, county and municipal bituminous road and street repair work or the resurfacing of brick and concrete has been announced by the White Manufacturing Co., Elkhart, Ind. This machine is designed to make any formula mix for base binder or top, sheet asphalt, cut back, oleum spirit and other volatile mixtures, to match any type of old pavement or to furnish a fine mix for resurfacing hard pavements. The machine contains a stone and sand dryer, a pug mixer, a detachable bucket elevator, tar kettle, oil burners and measuring devices, and is mounted on rubber-tired wheels.

The Model L-1 is a complete small asphalt plant to produce high temperature mixes for immediate hot application or cooler mixes for deferred or cold laying. This model follows the general design of the Chausse-White street repair trucks. The new design, however, makes it applicable for the production of cold laying mixtures by building the pug mixer in the open and away from fire. Previous models were confined to hot mixing and the location of the pug mill adjacent to burners prevented the use of highly volatile bituminous oils.



The New Model L-1 White Highway and Street Repair Truck Which Is Completely Equipped and Powered with a Continental Engine

The manufacturer states that the total cost of maintenance work with this machine, including plant operation, interest, depreciation, all material, hauling and labor for laying should not exceed $4.50 per ton or 22.5 cents per square yard per inch thickness. These costs are based on the experience of users, at a rate of 30 tons per day of medium heat mix with local aggregate at 75 cents per ton. This machine can also be used to mix concrete and in winter the stone, sand and water can be heated. Its capacity is rated at 25 tons per day of high-temperature mix and 40 tons per day of low or medium-temperature mix.

In operation, the dryer is fed by the detachable bucket loader. The rotating dryer is mounted on SKF bearings, is heated by three self-generating oil burners, and has internal blades for cascading the material and advancing it towards the discharge end. The aggregate is measured in a 4-cubic foot capacity hopper with a bottom gate which discharges directly into the pug mixer. The bitumen is heated in a 150-gallon tar kettle and is measured in a trough graduated up to 6.5 gallons capacity or 12 per cent mix. The mixed material is discharged from the pug mixer either directly into a wheelbarrow or to a belt conveyor or, by raising the machine or digging a pit, directly into a truck body. The machine is fully portable, equipped with a towing tongue and weighs 8,000 pounds. This machine is offered at a considerable reduction in price from previous street repair plants made by the White Manufacturing Co. and its subsidiary, the Chausse Oil Burner Co., both of Elkhart, Ind.

The Lansing Contractors' Wheelbarrow

A Rubber-Tired Wheelbarrow for Concrete

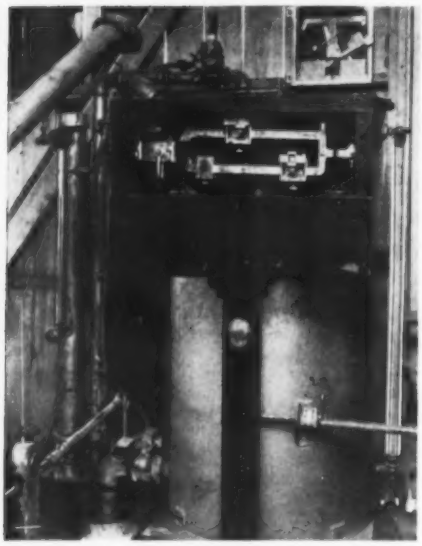
A CONTRACTORS' wheelbarrow with a tray capacity of 5 cubic feet, which will handle 4 cubic feet of sloppy concrete without spilling and equipped with a 16 x 4-inch pneumatic rubber tire, has been announced by the Lansing Co., Lansing, Mich. This new F-25 barrow is one of the new improved F-type lines of Lansing wheelbarrows. It is equipped with a pressed steel dump guard at the forward end, has a never-slip axle screwed into the wheel bearings and has a steel bushing on each wheel hub. There are heavy shoes clamped around the legs which are of heavy channel iron. Between the tray and the dash braces is a heavy reinforcing steel plate. The barrow is equipped with a curved dash brace made of channel iron and a steel rod is rolled into the top of the tray for added strength and protection of the tray.

A Spreader with No Moving Parts

A SPREADER for sand, slag, salt, calcium chloride, chips, gravel, cinders and stone which spreads these materials uniformly to a width of 9 feet has been announced by D. C. Elphinstone, Inc., 115 So. Calvert St., Baltimore, Md. The Best Spreader consists of a series of troughs made of 14-gage metal, the sides of which are 2 inches high, the combined bottoms forming a flat, fan-shaped surface spreading the aggregate from the tail end of a dump truck. The front end, which attaches to the truck, is 6 feet wide, the back or discharge end is 8½ feet wide and the length is 2½ feet. The spreader weighs 235 pounds, including two 5-foot back end hanging chains by means of which the spreader is suspended from the back of the truck.

In operation, as the body is elevated and the tail gate opened, the material flows by gravity down the troughs and is discharged in a smooth sheet 9 feet wide. The number of pounds of material per square yard of road surface to be spread is governed entirely by the width of the tail gate opening and the speed of the truck, and can be varied to suit all conditions. The spreader can be installed by two men in two minutes, and has no moving parts.

A Stone Spreader Without Moving Parts



The New Blaw-Knox Automatic Water Tank Mounted on Fairbanks Beam Scales

An Automatic Water Weighing and Measuring Tank

CONTRACTORS in the past have experienced considerable difficulty in measuring water for concrete mixing plants, automatically and accurately, and at the same time having a piece of equipment which can be set to different measurements quickly and simply. The new automatic water tank developed by Blaw-Knox Co.,2067 Farmers Bank Bldg., Pittsburgh, Pa., consists of a cylindrical water tank mounted on a Fairbanks platform scale. The scale is equipped with a double beam, both beams being graduated in gallons. The required number of gallons of water is established by means of the poise on the upper beam. Deduction for moisture contained in the aggregate is obtained by setting the poise on the lower beam with the number of gallons to be deducted.

The inlet valve is opened by a push-button control located in any position that is convenient. Water flows into the measuring tank until the weighing beam balances. The weighing scale is equipped with a springless type indicator which includes electrical contact so that when the beam is level, contact is made and the electrically controlled inlet valve is instantaneously closed. Discharge of the water from the tank to the mixer is either manually operated or arranged for mechanical operation with remote control.

The water weighing tank is also equipped with a glass gage and calibrated scale to show the number of gallons of water in the tank at any given time. In addition, there is a riser pipe in the water supply line so arranged that water hammer, due to the instantaneous closing of the inlet valve, is absorbed without shock. A strainer is also placed ahead of the inlet valve to remove soot and foreign material from the water.

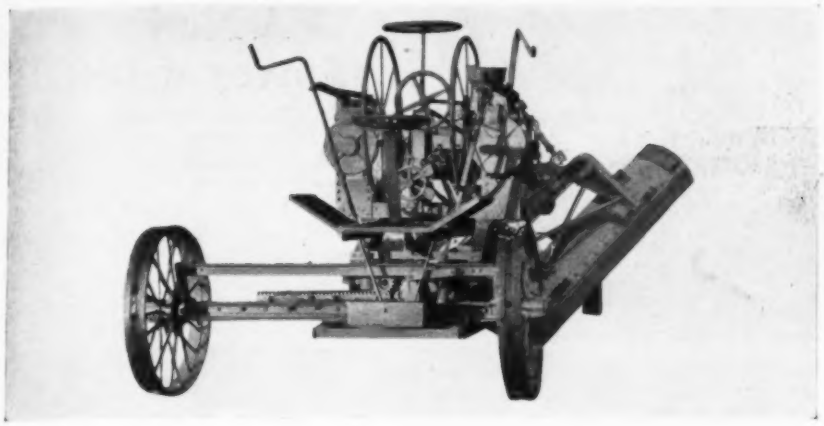
More Information on the Name Plate

FOLLOWING the lead of the electrical industry which cleared up a state of confusion because of conflicting horsepower and rating claims which required special interpretation for the user in each case, the Waukesha Motor Co., Waukesha, Wis., has announced its decision to apply a horsepower rating plate to its complete line of Full-Power engines. Waukesha believes that by stating frankly on the engine the maximum horsepower for which it is designed at several commonly used speeds, it will materially assist all users in the proper selection of the engine for a given duty. As a means of educating the public to an appreciation of what to expect from an engine, it probably will be a big factor and it certainly should be a satisfaction to every manufacturer of a power-driven machine to be able to point directly to the nameplate of the engine and settle any uncertainty about its output capacity. A contractor who has any question about the characteristics of the engine need only consult this new nameplate to answer practically any point, as even such maintenance questions such as valve settings, oil specifications and spark advance are given.

A 505-Foot, Two-Stage Portable Compressor

A PORTABLE air compressor, providing 505 cubic feet displacement against the customary working pressure of 100 pounds per square inch, has been placed on the market by the Sullivan Machinery Co., 400 No. Michigan Ave., Chicago, Ill. This unit is a two-stage four-cylinder type compressor powered by a 6-cylinder Climax engine, coupled to the compressor by the standard Sullivan gear-type coupling, with twin disc clutch and self-starter. The entire rig is mounted on a heavy fabricated steel plate frame and mounted on steel wheels with rubber tires.

Six Galion Motor Patrol Graders Equipped with J. I. Case Power Units Which Were Recently Purchased by the Texas State Highway Department



The New Allis-Chalmers No. 10 Leaning-Wheel Grader

A Hand-Controlled Leaning-Wheel Grader

DURING the past year the heavy 10-foot graders led all other sizes of tractor-drawn graders in the number of units sold, according to Allis-Chalmers Mfg. Co., Milwaukee, Wis. The Allis-Chalmers No. 10 is a conventional hand-controlled leaning-wheel grader built unusually strong and heavy and yet easily controlled by hand. The front-end construction consists of a large cast steel ball and socket which connects the frame and drawbar to the front axle. This is surrounded by a semi fifth-wheel plate which adds stability to the frame. The pull of the tongue is directly against the center of the large ball, eliminating any tendency to pull the front truck from under the grader.

The simplicity of the crank-type wheel-lean mechanism used in this machine is designed to eliminate trouble in this section. The cast manganese full-circle is turned by a large worm and gear which locks at any point, giving the moldboard the exact angle required. A simple clutch between the large worm and circle-turn pinion may be released instantly, allowing the circle and moldboard to be reversed by ground contact if desired.

Four-Wheel Drive for Light Trucks

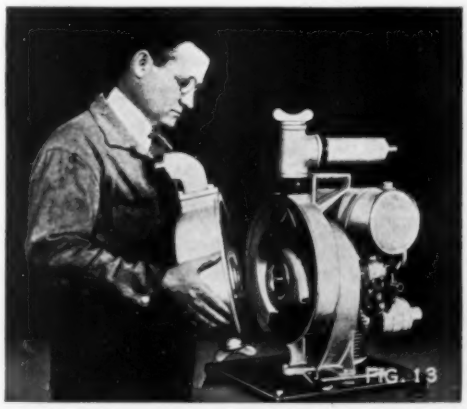
ONE of the latest automotive achievements is the development of a four-wheel drive for Ford trucks. Installation of the Grico four-wheel drive made by The Gear Grinding Machine Co., Christopher and Conant Aves., Detroit, Mich., increases the capacity of the truck to carry the load by centering the load approximately over the trunnion which is a point midway between the two driving axles, thus relieving the front end to concentrate on its job of handling the motive power and permitting easy steering and handling. Through the two Rzeppa constant velocity universal joints and the third differential, the power of the engine is equally distributed to the two axles. The eight speeds give the truck driver a chance to select the gear ratio which gives the maximum effect of the motor under the varying conditions of road surface and grade. All four wheels are equipped with adequate brakes, more than doubling the brake power for adequate control under the increased load.

With the Grico four-wheel drive installed, the power take-off becomes the main drive shaft running through the transfer case on ball bearings. It operates when the power transfer gears are in neutral and has the four standard speeds and reverse of the truck transmission. The full driving power of the motor is thus conveniently available for auxiliary use.

A Simplified Self-Priming Pump

A SELF-PRIMING centrifugal pump which has no valves of float and is simple and accessible has been developed by the Homelite Corp., 71 Riverdale Ave., Port Chester, N. Y. The Homelite pump consists of just one pumping chamber which can be inspected by merely removing the end plate. There are no valves or floats to get out of order. After the end plate is removed, the impeller housing can be lifted free, the impeller screwed off and the sealing rings removed. These simple operations constitute a complete dismantling of the pump end. Then the engine can be removed as a complete self-contained unit by merely taking out six cap screws by which it is secured to the pump housing. There is no bearing whatsoever in the pump end, thereby eliminating the most common source of trouble with pumps. The impeller screws directly on to the engine crankshaft. If the sealing rings eventually wear out, any water leaking by will simply run down and out at the bottom of the pump housing.

The pump has a 2-inch suction and 2-inch discharge and a guaranteed suction lift of 28 feet. It will deliver up to 7,500 gallons per hour or as low as 1 gallon per hour of seepage. From 7 to 55 seconds, depending upon the suction lift, is all that is required for priming. A short lever indicator thrown to one side increases the priming power of the pump and, moved to the other, increases the volume. Thus if the pump is working on seepage, the lever is placed at the priming side and if it is pumping from a large volume of water, the lever is thrown to the opposite side.



The Homelite Self-Priming Centrifugal Pump

The New Hydraulically-Operated Bottomless Scraper

A Bottomless Hydraulically-Operated Scraper

A BOTTOMLESS scraper constructed of heavy plate with box-type sections and a scientifically designed electric welded bowl is now being manufactured by the LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa, from the designs of the Knapp Mfg. Co. of Oakland, Calif. A double edge reversible cutting blade of hardened steel is bolted to the bottom of the bowl and is easily removed or reversed. Hydraulic power for operating the scraper is obtained by a simple oil pump placed on the tractor power take-off and designed so that it does not interfere with hauling or other units when the scraper is detached. A single lever is placed near the tractor operator's seat, enabling him to control the depth of the cut.

The scraper cutting depth can be varied from 1 inch to approximately 12 inches. The depth of spreading can be varied from 1 to 18 inches. The scraper wheels are placed behind the cutting edge, assuring their traveling on the finished grade at all times. The oscillating bowl is an exclusive feature on this scraper. By being able to tilt the bowl at either end, it is comparatively easy to start a cut on a steep side hill. After the cut is started the bowl can be leveled and the cut continued as desired. It requires only one or two minutes to adjust this oscillating feature. These scrapers are made in capacities of 3, 5, 5½ and 6 cubic yards.

An Improved Streamline Tire

PRODUCTION has recently been started on an improved type of tire, the 1933 streamline General Jumbo tire, a product of the General Tire & Rubber Co., Akron, Ohio. General has developed this tire on the same basic principles upon which streamline Jumbo tires have been built for over a year. These basic principles of construction, regarded by tire engineers as revolutionary when introduced, have proved fundamentally correct, according to the General Tire & Rubber Co.

This new streamline Jumbo has been strengthened structurally. The tire differs radically from all other types of conventional super-balloon or so-called "doughnut" tires. Its shape is pyramidal, its almost straight side-walls tapering from a tread no wider than that of the ordinary balloon tire it replaces, to a base wider than any other part of the tire. Built like a cantilever bridge, the tire has maximum stability because of its broad base while the narrow tread makes steering and parking easy. The many side-wall prisms on the new tire slow down the reaction of air compression when the tire strikes bumps or depressions in the surface, snubbing the return shock and producing in effect "lazy-rubber" riding ease.

A New Conveyor Belt

A CONVEYOR belt constructed with the carcas and rubber covers bound into a homogeneous unit has been announced by the Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., Passaic, N. J. In the thorough field of testing which these belts have undergone the manufacturer reports unusual performance. This is attributed to the effective bonding and extreme flexibility.

The five advantages claimed for the new Condor conveyor belt are: extreme flexibility, stretch reduced to a minimum, longer belt life, inseparable wear-resisting covers, and puncture resistance to a high degree.

A New 2-Ton Truck

A NEW 6-cylinder Model B-4 motor truck of 2-ton capacity available in three wheelbases, 145 inches for dump and semi-trailer service and 170 and 185 inches for general hauling, has been announced by the International Harvester Co. of America, Inc., 606 So. Michigan Ave., Chicago, Ill. The engine of this new truck is of International Harvester design and manufacture and develops 63 brake horsepower at 3,200 rpm. Among the features of the B-4 engine are its 69-pound counterbalanced four-bearing crankshaft, removable cylinders which permit replacement of one or more cylinders without the expense of reboring, hardened exhaust valve seat inserts, full-force feed lubrication, thermostatically-controlled cooling systems and downdraft carburetion.

The 11-inch, single-plate, vibration-dampened clutch, the four-speed transmission and the engine are mounted as a unit and are suspended at three points in the chassis. High road speed is possible in high or direct gear while with the three lower reductions, ample pulling ability is available for hill climbing and sand or soft roads. Ability to carry capacity loads and withstand distortion caused by road inequalities is assured by the unusually strong frame of heavy pressed steel channels. These channels are 8 inches deep, and tapered at the front and rear ends to provide a low loading platform height. Heavy channel-type cross members are gusseted to the side rails. Ample load-carrying capacity is also provided in the full-floating, spiral-bevel-drive rear axle by the use of a heavy rigid, banjo-type, malleable-iron housing. Included as standard equipment are semi-elliptic auxiliary rear springs and mechanically-operated four-wheel service brakes.

The New Model B-4 International 2-Ton Truck

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MACHINERY & MATERIALS — DESCRIPTIONS and ILLUSTRATIONS

Check These Lists Each Month and Write for Catalogs You Need.

A Low-Cost Bulk Cement Plant

348 Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh, Pa., in its Circular No. 1356 describes in detail the new Blaw-Knox low-cost handy bulk cement plant which is portable, can be quickly set up and moved from job to job, has plenty of clearance for trucks, no need to dig out for the driveway, and can be furnished with an automatic control batcher if desired.

Roller Bearing Jaw Crushers

349 Badger roller bearing crushers which give a 20 to 30 per cent power saving, have smooth operation as they are counter balanced with fly wheels, have low upkeep because of the lack of vibration and sturdy construction and which give large production are described in an illustrated folder of the Wisconsin Foundry & Machine Co., Madison, Wis.

Four-Wheel Drive for Light Trucks

350 Folder A-2 issued by The Gear Grinding Machine Co., Christopher and Conant Aves., Detroit, Mich., describes the Grico four-wheel drive for Ford trucks, permitting a 1½-ton Ford to develop the carrying capacity of a 3½-ton truck.

A New Three-Way Crawler Dump Wagon

351 The Trackson Co., 1323 So. First St., Milwaukee, Wis., has announced the addition of a 3-way crawler dump wagon with 7 to 10½ cubic yards capacity to its line of dirt hauling wagons. Data on the special features of this Trackson 3-way will gladly be furnished by the manufacturer.

New 10-S Drum Type Mixer

352 An attractive bulletin describing the new Master 10-S mixer, a precision-built two-bagger, will gladly be sent on request by the Construction Machinery Co., Waterloo, Iowa, to any contractor interested in a machine which is lower, narrower and lighter, yet stronger throughout and capable of maximum production.

A 6-Inch Diameter Roller Bearing Idler

353 Fairfield Engineering Co., Marion, Ohio, has announced a new line of Fairfield idlers for belt conveying systems. These are equipped with Timken roller bearings and are 6 inches in diameter. The idlers are available in both the troughing and return roller type and are described completely in literature which may be secured from the manufacturer.

A 1933 Model Asphalt Distributor

354 The 1933 Model Kinney distributor made by the Kinney Mfg. Co., 3529-3541 Washington St., Boston, Mass., has many unusual features, including safety heating methods which make it possible to heat one-third or even one-fifth of a tankful of asphalt safely. The pump, which is used as a meter, is flanged directly to the bottom of the tank eliminating piping and friction, and the spray bars have lateral movement to offset curbs, etc. This distributor is described completely in literature which may be secured from the manufacturer.

A 1933 Streamline Tire

355 General Tire & Rubber Co., Akron, Ohio, has announced the 1933 General streamline Jumbo balloon tire which differs radically from all types of conventional super-balloon or "doughnut" tires. Its shape is pyramidal, its sidewalls straight, tapering from a tread no wider than that of the ordinary balloon tire to a base wider than any other part of the tire. The advantages of this type of tire in parking and steering and absorbing road shock is told in literature which may be secured from General.

A New 12-Foot Leaning-Wheel Blade Grader

356 The Austin-Western Road Machinery Co., 400 N. Michigan Ave., Chicago, Ill., will be pleased to furnish complete information regarding the new Austin No. 12 grader, a super-rigged unit with a 12-foot blade, cutting 18 inches below ground level, with a high reach of 7 feet 10 inches and complete with hydraulic power control for fast, smooth and easy control for leaning the wheels, shifting the rear axle, and operating the blade, pole steer and scarifier.

Conveying and Screening Equipment for Gravel and Stone

357 The Ladel Conveyor & Mfg. Co., New Philadelphia, Ohio, will be pleased to send its literature describing Summit vibrating screens, belt conveyor parts and other material-handling equipment for crushed stone and gravel to contractors having contracts requiring this type of equipment in prospect.

A New Ball-Bearing Saw Rig

358 Chain Belt Co., 1666 West Bruce St., Milwaukee, Wis., has announced two new saw rigs. The No. 5 will handle all types of cuts found necessary on construction jobs and the No. 3, a smaller unit, can be moved about in a building and through doorways for maintenance and other work. Complete information may be secured direct from the manufacturer.

Swing-Hammer Pulverizers and Crushers

359 Catalog No. 550 recently issued by the Jeffrey Mfg. Co., Columbus, Ohio, completely describes and illustrates Jeffrey swing-hammer pulverizers and crushers for successfully reducing asphalt, brick bats, cement rock, dolomite rock, garbage tankage, gypsum, limestone, macadam, soapstone, tankage and slag. This machine operates on the principle of reducing the material by striking it while in suspension, as opposed to the attrition mill which smashes or rolls the substance between two surfaces.

Pulverized Petroleum Asphalt for Road Construction

360 Lincoln-Ite, a pulverized petroleum asphalt which improves any oiled road surface and which aids the quick drying of oily roads, is described in detail in an illustrated booklet published by the Asphalt Division, The Ohio Oil Co., Robinson, Ill.

A Maintenance Tool for New Oiled Surfaces

361 The Denver Road File, consisting of blade-like sections mounted on flat steel springs that it may conform to the contour of the road, which is pulled behind a truck for maintaining new oiled surfaces when first opened to traffic and is capable of blading to a depth of 1-inch or less, is described in the latest literature of The Automobile Storage Elevator Co., 304 Flatiron Bldg., Denver, Colo.

A Cart-Type Bituminous Distributor

362 A cart-type bituminous distributor for attaching to tank trucks for the application of road oil, cut back and emulsion and which can be steered to offset it 6 feet laterally, permitting work on shoulders where heavy trucks cannot operate, and which has other special features is described in a circular which may be secured from the Rosco Mfg. Co., 928 S. Fourth St., Minneapolis, Minn.

Curing Modern Concrete Roads

363 This is the title of a 20-page bulletin recently issued by the Philadelphia Quartz Co., 121 So. Third St., Philadelphia, Pa. The booklet covers the development of curing with silicate of soda from the road laid in Dallas County, Texas, in 1918 to present day construction in all parts of the country. In addition the advantages and cost of silicate curing, and the instructions for application, are reviewed. The bulletin is attractively illustrated with many photographs.

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Machinery and Materials

(*Continued from page 42*)

A Tractor Derrick for Diversified Jobs

364 The LeTourneau tractor derrick for loading, lifting, handling, erecting, moving and unloading pipes, poles, bridge members, building steel, machinery and rails, building pipe lines and ripping up tracks is described in literature which may be secured direct from R. G. LeTourneau, Inc., Wilson Way at Roosevelt, Stockton, Calif.

Hand Floats and Bull Floats

365 GiantGripT hand floats and bull floats for concrete highway work and which are adjustable, tight and wiggle-proof are described in the new 1933 Catalog C which may be secured from L & M Mfg. Co., 10276 Berea Road, Cleveland, Ohio.

A Rubber-Tired Contractors' Barrow

366 The Lansing contractors' barrow F-25 with a 16 x 4-inch Goodyear pneumatic rubber tire, a tray capacity of 5 cubic feet and built strong and durable is described in the literature of the Lansing Company, Lansing, Mich.

New Low Prices on 25 to 140-HP Power Units

367 Bulletin 160 issued by Wisconsin Motor Corp., Milwaukee, Wis., gives complete information regarding Wisconsin power units from 25 to 140 horsepower, both portable and stationary, and which are offered at new low prices for the same high quality.

A New Bituminous Mixer

368 A four-page bulletin has just been issued by the Kwik-Mix Division, National Equipment Corp., No. 30th Street and W. Concordia Ave., Milwaukee, Wis., describing the new Kwik-Mix bituminous mixer built in two sizes and permitting the indirect application of heat by means of a shell around the drum to prevent burning and to insure a clean drum.

A New Hydraulic Bulldozer

369 The new hydraulic bulldozer developed by The Frank G. Hough Co., 919 No. Michigan Ave., Chicago, Ill., for the McCormick-Deering T-40 TracTracTor is described completely in literature which may be secured direct from the manufacturer.

A Power-Controlled Elevating Grader

370 Complete specifications and an unusually large illustration of the new power-controlled Caterpillar elevating grader is found in Form 1851 issued by Caterpillar Tractor Co., Peoria, Ill. The power-operated controls for the adjustments of the carrier, depth of plow cuts and plow sections are not affected by the release of the main clutch and are immediately at the right of the operator.

Concrete Mixers and Block Machinery

371 The Panama line of concrete block equipment which includes hand or power concrete mixers, concrete block machines capable of producing various faces, power tampers for blocks, sill and cap machines, multiple block machines, concrete fence post molds and head and power screens are described in a 40-page illustrated catalog which may be secured gratis from The J. B. Foote Foundry Co., Fredericktown, Ohio.

Automatic Air Hose Couplings

372 Robinson automatic air hose couplings for pipe and hose lines, which eliminate all unnoticed air leaks at openings in hose lines and which eliminate kinking of air hose, are described completely in folders which may be secured from the Morton Mfg. Co., Muskegon Heights, Mich.

Soil Stabilization with Calcium Chloride

373 Full particulars regarding the use of calcium chloride for compacting road surfaces and stabilizing the soil, thus offering new type low-cost roads may be secured from the members of the Calcium Chloride Association; Solvay Sales Corp., 61 Broadway, New York City; The Columbia Alkali Corp., Barberton, Ohio; Michigan Alkali Co., 10 E. 40th St., New York City; and The Dow Chemical Co., Midland, Mich.

The Maintenance of Heavily-Traveled Asphalt Roads

374 Economy in the annual cost of asphalt road maintenance per mile over a period of years is the test of a road material. Complete figures on a road which carries an average traffic of 2,500 vehicles per day and a maximum traffic of 4,000 vehicles per day and which showed a total cost of only $261.08 per mile over a period of eleven years is given in a folder which may be secured from Koppers Products Co., Koppers Bldg., Pittsburgh, Pa.

A New Tandem Axle Machinery Trailer

375 Complete information on the new tandem-axle LaCrosse trailer which retains all the fully reversible advantages of the regular dual axle models and which permits the wheels to follow the contour of the road surface without disturbing the level of the loading platform, may be secured by those interested from the C. R. Jahn Co., Builders Bldg., Chicago, Ill.

A Spreader with No Moving Parts

376 The Best spreader which handles sand, slag, salt, calcium chloride, chips, gravel, cinders and stone is low in initial cost, has no moving parts, is very easily handled by two men, is easily transported and stored, and is quickly attached in two minutes, spreads material uniformly to a width of 9 feet, has an unobstructed gravity flow and is described in literature which may be secured from D. C. Elphinstone, Inc., 115 So. Calvert St., Baltimore, Md.

Drop-Forged Crawler Wagon Track

377 Allis-Chalmers Manufacturing Co., Milwaukee, Wis., will be pleased to send its latest folder, "On the Right Track" which describes the A-C drop-forged 15-ton steel truck for crawler wagons, in which the load is carried on anti-friction bearings. These tracks are made for all makes of track-type wagons.

A New 2-Yard Shovel

378 A new Model-80 2-yard shovel with all-welded boom and dipper sticks, a patented independent crowd and special crawler design, has been announced by the Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill., which will be pleased to furnish complete information to contractors on request.

Machinery and Materials

Wheeled Scoops for Grading

379 Insley-Hercules scoops which dig automatically by power, lift and carry the dirt, dump it and spread it accurately and compactly with speed and a high degree of control and which are normally operated in trains of three and four and are made in 1 and 2-yard sizes are described in a new 8-page illustrated folder which is complete with operating data which may be secured from the Insley Mfg. Co., Indianapolis, Ind.

Hammermill Crushers

380 Catalog 30 issued by the Gruendler Crusher & Pulverizer Co., 2915-2917 No. Market St., St. Louis, Mo., describes Gruendler heavy standard hammer crushers which are adjustable to any size fineness desired from as coarse as 8 inches to as fine as 100 mesh. All parts of the crusher are adjustable for wear.

A Completely New Dragline Bucket

381 The Page Engineering Co., Clearing Station, Chicago, Ill., will be pleased to furnish information to any contractors interested regarding the new and radically different form of bucket which it has developed for dragline excavation. The new Page bucket has a rocker-type hood which represents the culmination of thirty years effort in overcoming the deficiency of the so-called standard buckets.

Welding and Cutting Equipment

382 Victor Welding Equipment Co., 844 Folsom St., San Francisco, Calif., will be pleased to furnish its supply price list, apparatus repair parts price list and complete information regarding Victor welding and cutting equipment.

Portable Air Compressors

383 Air King portable air compressors of the Towabout type in capacities of 120, 180, 240, 310 and 360 cubic feet are described in a new series of folders punched for loose leaf filing which may be secured from the Worthington Pump & Machinery Corp., Harrison, N. J.

A New Catalog on Air Filters and Flame Arresters

384 Air-Maze air filters, carburetor silencers, flame arresters and crank case breather protectors of both the open type and oil bath models are described with data and dimension drawings especially valuable to users of power equipment in the new catalog of the Air-Maze Corp., 313 Caxton Bldg., Cleveland, Ohio.

A High-Speed Grinder for Removing Bumps in Concrete

385 The Mall high-speed floor and border grinder which carries its own water tank and a 12-inch bull floating grinding wheel operating at 3,000 rpm and which is used effectively for grinding down bumps in concrete pavements is described completely in Catalog 333 which may be secured from Mall Tool Co., 7740 So. Chicago Ave., Chicago, Ill.

A Mechanically-Vibrated Screen

386 Universal mechanically-vibrated screens built to withstand the hardest kind of service and which handle all materials efficiently and are particularly adaptable to the separation of stone, gravel, sand, and other construction material are described completely in the well illustrated 32-page Catalog No. 99 issued by Universal Vibrating Screen Co., Racine, Wis.

Rock Drilling Equipment and Accessories

387 Bulletin GP, Fourth Edition, has just been issued by the Gardner-Denver Co., Quincy, Ill., and comprises 24 pages of text and illustrations covering the complete Gardner-Denver line of portable air compressors, rock drills and accessories.

Penetration Macadam Pavements

388 Bulletin No. 1 issued by American Bitumuls Co., 200 Bush St., San Francisco, Calif., describes the use of Bitumuls, a cold asphaltic emulsion binder, and the successful methods employed in constructing penetration pavements with this material. The bulletin is well illustrated and goes straight to the point.

The Use of Steel Liner Plates

389 Data Book No. 5 which has just been issued by the Pressed Steel Division, the Truscon Steel Co., 6100 Truscon Ave., Cleveland, Ohio, gives data on the most modern methods of executing underground structures through any type of non-supporting ground in any standard contours, including circular, egg-shaped, etc., and in sizes ranging from 3 feet 9 inches in diameter to upwards of 80-foot spans.

Portable Diesel Power Units

390 Bulletin H-101 issued by Cummins Engine Co., Columbus, Ind., describes the new Model H, 4 and 6-cylinder automotive-type high-speed diesel engines with complete equipment and designed for operating on low price fuel oil to drive generators, compressors, sand, gravel and crushed stone plants, pumps and for permanent installations where desired.

A 505-Cubic Foot Two-Stage Portable Air Compressor

391 Sullivan Machinery Co., 400 No. Michigan Ave., Chicago, Ill., has announced a new 505-cubic foot two-stage portable compressor WK-314 of the V type which is described completely in Bulletin No. 88-G.

New Catalog on a Standard Half-Yard Shovel

392 The new Catalog 30-A of Bay City Shovels, Inc., Bay City, Mich., contains complete detailed specifications, working range diagrams and illustrations of the Bay City Model 30, a standard ½-yard shovel convertible to dragline, skimmer, clamshell or 6-ton crane.

Electric Vibrating Screens with No Mechanical Moving Parts

393 Trayco TR-7 electric vibrating screens with no mechanical moving parts and which are easily installed and operated for the preparation of aggregates for concrete are described in Bulletin S-104 which may be secured from The Traylor Vibrator Co., 1400 Delgany St., Denver, Colo.

An Internal Vibrator for Concrete

394 The new Munsell vibrating blade provides an effective mechanical means for vibrating concrete in those hidden places that cannot be consolidated by any of the older methods. Full information may be secured from Munsell Concrete Vibrators, 269 Cherry Lane, Teaneck, N. J.

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MUNDY Hoists
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UNION—Pile Hammers
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Contractors' Tools and Equipment

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KOEHRING—Cranes, Shovels and Mixers
PARSONS — Trench Machines and Backfillers
INSLEY—Excavators and Concrete Placing Equip.
CHICAGO—Auto. Conveyors
ROGERS—Trailers
HAUCK—Kerosene Heaters
CONNERY & CO.—Asphalt Kettles
SASGEN—Derricks
JOHNSON Bins and Batchers
NOVO — Gasoline Engines, Pumps and Hoists
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BLAW-KNOX CO.—Dirt-moving Equipment
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W-K-M Hoists and Rock Crusher for Tractors
WILLAMETTE-ERSTED Hoists for "Caterpillars"
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EUCLID Scrapers and Wagons
HERCULES Gasoline Rollers
WAUSAU Snow Plows
C. R. JAHN CO.—La Crosse Tu-Way Trailers
CURTIS Portable Compressors

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KNICKERBOCKER Concrete, Plaster and Mortar Mixers
LE ROI—Rix Air Compressors
NOVO Hoists
ERIE—Clamshell & Dragline Buckets, Aggregators & Plants
M & M Form Clamps and Shores
TOLEDO Torches
WOOD Shovels
MARLOW Pumps
NORTHERN Conveyors

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NORTHWEST—Cranes, Shovels, Draglines
BLAW-KNOX—Steel Forms, Bins, Buckets
ORD—Concrete Road Finishers
CARTER—"Humdinger" Pumps
INGERSOLL-RAND—Air Compressors
ORR-SEMBOWER—Hoists, Boilers, Mixers
ROOS—Shores and Clamps
HAUCK—Oil Burners and Heaters
HAISS—Elevators, Conveyors and Loaders
ALLIS-CHALMERS—Tractors
BAKER—Bulldozers
SARGENT—Plows
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Caterpillar Tractor Co.—Tractors, graders, road machinery
Domestic Engine & Pump Co.—Hoists, pumps
Gardner-Denver Co.—Air Compressors and tools
Killefer Mfg. Corp.—Road and farm tools
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A. Leschen & Sons Rope Co.—Wire rope
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BB Steel Hand Hoists
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Clyde Hoists, Derricks
Domestic Pumps
Euclid CrawlerDump Wagons and Automatic Scrapers
Haiss Loaders
Highway Sanders
Koppel Industrial Cars
McKiernan-Terry Pile Hammers
Allis-Chalmers Tractors
Northern Conveyors
Northwest Shovels and Cranes
Nye Steam Pumps
Ord Road Finishers
Ransome Pavers and Towers
"Snow King" Plows
Whitcomb Locomotives
Sullivan Air Compressors
Allis-Chalmers Graders, Motor Patrols and Dump Wagons
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INDESTRUCTIBLE Grader, Conveyor Belts
MODERN Pumps, Generators
SCHRAMM Air Compressors, Tools
NICO & UNITY Culverts
BLUE DIAMOND STEEL Cutting Edges
STREICH Wagons
QUIKWAY Street Marker
MASSEY-HARRIS 4-Wh. Drive Tractors
TOLEDO Torches, Steel Horses
GROUNDHOG & MASTER Scrapers
BADGER Crushers, Screening Plants
LANSING Concrete Mixers
RED & YEL TECO Signs
ROOT Truck Scrapers
BUTLER Soft Road Bridging
MASTER Traffic Controls
BLACK Wire Rope & Cable
GENERAL Barrows, Shovels
NEW ENGLAND Loaders
GILBERT Fresno Shoes
CAMEL Crawler Wagons
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Barnes—Pumps
General—Wheelbarrows, Concrete Carts
Ingersoll-Rand—Compressors, Air Tools
Knickerbocker—Concrete Mixers, Saw Rigs
Lackawana—Steel Sheet Piling
Lambert-National—Hoisting Engines and Winches
Sasgen—Derricks and Winches
American Steel & Wire—Wire Rope
Wood—Shovels, Picks and Mauls
Dravo—Bottom Dump Buckets
TriLok—Steel Grating
American Marsh—Redi-Prime Pumps
Homestead Valve—High Pressure Jenny

LANGE TRACTOR & EQUIPMENT COMPANY

304 Lake Ave. S **Duluth, Minn.**

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Willamette-Ersted Co. Tractor Hoists
LaPlant-Choate Mfg. Co. Wagons, Bulldozers, Backfillers, Snow Plows
Wausau Iron Works Snow Plows
Hi-Way Service Corp. Bulldozers, Scarifiers
Leach Co. Concrete Mixers
Davey Compressor Co. Air Compressors
Oshkosh Motors Four-Wheel Drive Trucks
Diamond Iron Works Gravel Crushing, Screening, Washing Plants
Thew Shovel Co. Shovels
Blaw-Knox Co. Ateco Dirt-moving Equipment
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BARNES MFG. CO.—Pumps
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HIGHWAY TRAILER CO.—Trailers

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18 Grandville Ave., S.W., Grand Rapids, Mich.

Representing

ALLIS-CHALMERS—Tractors, Graders
BAKER—Snow Plows, Road Equipment
BERG—Concrete Finishers
CLEVELAND—Air Tools
DIAMOND—Crushers, Gravel Plants
FLEXIBLE—Road Joint Machinery
FOUR WHEEL DRIVE—Trucks
HELTZEL—Forms, Bins, Batchers
HUBER—Rollers
INSLEY—Towers, ½-yd. Shovels
KOEHRING—Shovels, Cranes, Draglines, Pavers, Mixers
KWIK-MIX—Mixers
LITTLEFORD—Kettles, Heaters, Asphalt Machinery
MACWHYTE—Wire Rope
MILWAUKEE—Locomotives
NEISS—Rotary Snow Plows
NOVO—Engines, Pumps, Hoists
NORTHERN—Conveyors
PARSON—Trenchers, Backfillers
ROSCO—Oil Distributors
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MINNEAPOLIS EQUIPMENT CO.

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BRODERICK & BASCOM—Wire Rope
CHAUSSE—Asphalt Plants, Oil Heaters
DAVENPORT—"Cat Tread" Wagons
DIAMOND—Gravel Plant Equipment
FISCHER & HAYES—Concrete Form Devices
HUG—Roadbuilder Trucks
HUMPHRYES—Power Pumps
JONES—Superior Saw Rigs
JAEGER—Mixers, Hoists, Pumps, Truckmixers
KARDONG—Column Clamps
KIESLER—Clam Shell Buckets
LAKEWOOD—Tower Equip.
LE TOURNEAU—Grading Equipment
MORITZ—Snouldering Machines
MULTIFOOTE—Pavers
MUNDY—Hoisting Engines
NATIONAL—Form Clamps
NELSON—Spreader Ties
OSGOOD—Shovels, Cranes.
RED STAR—Carts, Wheelbarrows
SARGEANT—Cranes, Draglines, Dragline Buckets
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MARSH-CAPRON Mixers
SCHRAMM Air Compressors
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KILLEFER Road Tools
PIONEER Gravel Loading Plants
MYERS Pumps
BLAKE Type Jaw Crushers
CORNISH Crushing Rolls
LaPLANT-CHOATE Bulldozers and Rippers
BLAW-KNOX Dirt Movers
EUCLID Road Machinery
STERLING Pumping Units

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KILLEFER—Road Rippers
EUCLID—Automatic Scrapers, Wagons
PIONEER—Gravel Screening, Crushing and Washing Equipment
WAUSAU—Snow Plows, Tractor Equipment
AMERICAN HOIST & DERRICK CO.—Gas Shovels, Cranes and Draglines

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928 So. Fourth St. **Minneapolis, Minn.**

Representing

IOWA "Cedar Rapids" Crusher Plants & Equipment
KOEHRING Pavers, Mixers, Cranes
SMITH Pavers and Mixers
INSLEY Towers and ½-yard Shovels
PARSONS Trenching Machines, etc.
McCORMICK - DEERING Industrial Tractors
C. H. & E. Saw Rigs, Hoists, Pumps
KWIK-MIX Mixers
HERCULES Motors
JOHNSON Batchers and Demountable Bins
RIDDELL Power Grader
TRACKSON Loaders & Cranes
TRAILMOBILE Semi- and 4-Wheel Trailers
VULCAN Steam and Gas Locomotives
LIDGERWOOD Hoists
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SARGENT Snow Plows
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Butler Bin Co.
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Representing

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ATHEY Truss Wagons
ROTARY Snow Plows
WAUSAU Snow Plows
KILLEFER Road Machinery
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"CATERPILLAR"—Tractors & Road Machy.
KILLEFER—Road Rippers, Scrapers
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LENHART WAGON CO.—Tractor dump wagons
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ATHEY—Crawlers, dump wagons, trailers
BUCYRUS-ERIE—Shovels, cranes, draglines
PIONEER—Crushing, screening, washing plants
REX—Mixers, pavers, motomixers, pumps and saw rigs
BUTLER—Bins and batchers
BARBER-GREENE—Conveyors, loaders, ditchers
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RANSOME—Mixers, Pavers, Tower Equipment
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ERIE STEEL CONSTRUCTION CO.—Buckets
GARDNER-DENVER CO.—Air Compressors, Tools
GRUENDLER CRUSHER & PULVERIZER CO.—Rock Crushers
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Complete Plants Rented

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Owen—Clamshell Buckets
McKiernan-Terry—Steam Hammers
Vail—Wire Bar Ties and Twisters
Hauck—Heaters
Sasgen—Derricks & Winches
Skilsaw—Electric Hand Saws
Skelton—Hand Shovels
LeRoi—Gasoline Engines
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Complete Line of Road Machinery and Contractors' Equipment

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T. L. SMITH—Mixers and Pavers
INSLEY—Concrete Towers & Chuting
D-A—Lubricants
OWEN—Buckets
COLEMAN—Trucks
SCHRAMM—Air Compressors
AUSTIN-WESTERN—Graders, Sweepers and Small Tools
PIONEER Gravel Equipment
STEEL BRIDGES AND TRAFFIC TREAD

ALLIED CONSTRUCTION EQUIP. CO.
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Jaeger Machine Co.—Mixers, Pumps, Hoists, Towers, Mast Plants, Concrete Placing Equipment
Lakewood Engineering Co.—Finishing Machines, Subgraders, Form Tampers, Road Forms, etc.
General Excavator Co.—Shovels, Cranes, Draglines, Trenchers, Skimmers
Ohio Power Shovel Co.—Lima "101" Cranes, Shovels, Draglines
A. Leschen & Sons Rope Co.—Wire Rope and Blocks
Skelton Shovel Co.—Hand Shovels, Scoops
Bates Wire Tie Co.—Wire Bar Ties, Twisters
Vulcan Iron Works—Drop and Steam Hammers, Caps
Universal Form Clamp Co.—Form Clamps, Shores
Boston Woven Hose & Rubber Co.—Suction, Air, Steam, Water Hose
Winslow Government Scale Works—Weighing Scales
Sasgen Derrick Co.—Hand Derricks, Crabs, Winches
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TULLEY EQUIPMENT CO., INC.
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Representing

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ROGERS BROS.—Trailers
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LITTLEFORD Asphalt Heaters
SAUERMAN Cableways
INGERSOLL-RAND Compressors
LE ROI Engines
PLYMOUTH Locomotives
TEL-SMITH Crushers
BARNES Pumps
CLYDE Hoists
GENERAL Wheelbarrows
LESCHEN Hercules Cable
ATLAS Shores
ERIE Gravel Pumps
TWIN CITY Engines
WAUKESHA Engines
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WAUSAU IRON WORKS—Snow Plows
KILLEFER MANUFACTURING CO.—Road Rippers, Rotary Scrapers and Farm Implements
PIONEER GRAVEL EQUIPMENT MFG. CO.—Gravel Crushing and Screening Equipment
WILLAMETTE-ERSTED COMPANY—Tractor Hoists
BUCYRUS-ERIE CO.—Shovels, Draglines, Pull Shovels and Cranes
BUCKEYE TRACTION DITCHER CO.—Trench Excavators and Backfillers

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CLIMAX Engines
MARSH-CAPRON Mixers
WONDER Mixers, Pumps and Hoists
NOVO Engines, Pumps and Hoists
BEEBE Hand Hoists
NORTHWEST Shovels and Cranes
STERLING Wheelbarrows
WILLIAMS Buckets and Trailers
ALLIS-CHALMERS Tractors Elevating and Blade Graders & Track Type Wagons
BUTLER Bins
HOTCHKISS Steel Forms
GARDNER-DENVER Air Compressors
AMERICAN Wire Rope
BAY CITY Truck Cranes
CHICAGO Auto. Conveyors
JONES-SUPERIOR Saw Rigs
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MORRIS Sand Pumps
FISHER & HAYES Form Clamps
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Davey Compressor Co.
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LaPlant-Choate Mfg. Co.
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BAY CITY—Shovels and Drag Lines
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DIAMOND—Gravel Equipment
GLACIER—Wood and Wire Snow Fence
GOHI—Corrugated Metal Culverts
HYSTER—Hoists and Winches
MASTER—Rotary Scrapers and Backfillers
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SCHRAMM—Compressors

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JAEGER Concrete Mixers
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AEROIL Torches, Heaters

Steel Sidewalk and Curb Forms
"Mud Hog" Pumps
Material Elevators
Air Compressors
Gasoline Hoists
Trench Pumps
Carbic Lights
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Mortar Tubs
Steel Mortar Boxes
Picks and Shovels
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Scaffold Horses
Electric Drills & Saws
Chain Hoists

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Cleaver-Brooks Company
Cleveland Formgrader Co.
Diamond Iron Works
Huber Mfg. Company
Insley Mfg. Company
Koehring Company
Kwik-Mix Concrete Mixer Co.
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Chain Belt Co.
Chicago Automatic Conveyor Co.
Climax Engineering Co.
Elgin Corporation
Etnyre & Co.
Four Wheel Drive Auto Co.
Gallon Iron Works & Mfg. Co.
Gardner-Denver Co.
Goodyear Tire & Rubber Co.
Hazard Wire Rope Co.
Madsen Iron Works
Mohawk Asphalt Heater Co.
Novo Engine Co.
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Sauerman Bros., Inc.
Smith Engineering Works
Speeder Machy. Corp.
Thew Shovel Company
Williams Buckets & Trailers
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Member: Associated Equipment Distributors

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3rd and Union Streets
MOORESTOWN, N. J.
Phone 263

Representing

CLETRAC Crawler Tractors
ESSEX Hydraulic Bulldozers
ADAMS Leaning Wheel Graders
ADAMS Motor Graders
SCHAEFER Automatic Scoops
SARGENT Snow Plows
GRAVELY Tractor Mowers
KILLEFER Tillage Tools

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113 Frelinghuysen Ave., Newark, N. J.

Distributors of

Ingersoll-Rand Compressors and Tools
Marsh-Capron and Wonder Mixers
Marlo Pumps
Jones Superior Saw Rigs
Sterling Wheelbarrows
Aeroil Heaters and Tools

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Brockway Place White Plains, N. Y.

Contractors' Equipment Sales and Rentals

Agents for

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JAEGER Plaster Mixers
JAEGER Mortar Mixers
JAEGER Pumps
NATIONAL Hoists
JONES-SUPERIOR Saw Tables

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ROOSHORS and Column Clamps
ROOSPEED Steel Forms
SULLIVAN Compressors and Tools
MARLOW Pumps
CLYDE Hoists and Derricks
MASTER (Marsh-Capron) Mixers
ARCHER Tubular Towers
LINK BELT Shovels and Cranes
DEWALT Power Saws

Engine Parts—Form Clamps—Tools & Supplies

JOHNSON & DEALAMAN, Inc.

60 Marshall St. Newark, N. J.

Representing

RANSOME Pavers, Mixers and Chuting Equipment
PARIS—Transit Mixers
JOHNSON Steel Bins and Batchers
ERIE Gasoline Rollers
BAY CITY Truck Cranes
CARTER Centrifugal, Diaphragm and Force Pumps
ETNYRE Tar and Asphalt Distributors
WILLIAMS Trailers and Buckets
RED STAR Wheelbarrows, Batch Boxes, and Adjustable Shores
HANSON Gasoline Shovels and Cranes

H. M. HIRSCHFELD

16th Ave. & 63rd St. Brooklyn, N. Y.

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THE LAUSON CORP.
AMERICAN SAW MILL MACHINERY CO.
CONNEAUT SHOVEL CO.
THE LE ROI CO.

THE WHEELER EQUIPMENT CO.

242 Hopkins St. Buffalo, N. Y.

Representing

ATLAS—Shores
CASE—Tractors
CARTER—Pumps
CLEVELAND—Rock Drills, Tools
CONNERY—Heating Kettles
ERIE—Rollers
ESSICK—Plaster Mixers
HOTCHKISS—Steel Forms
HUG—Roadbuilders Trucks, Subgraders
JOHNSON—Bins & Batchers
LIMA "101"—Shovels
MARMON-HERRINGTON—Trucks
MEAD-MORRISON—Shovels, Cranes, Tractors
NELSON—Loaders
NOVO—Engines, Hoists
RICHMOND—Tysaws, Anchors
RAY-SIGNS—Traffic Signs
ROGERS—Trailers
ROTARY—Snow Plows
SARGENT—Snow Plows
SCHRAMM—Air Compressors
WEHR—Graders, Rollers

C. H. LOOMIS & CO.

304 Jelliff Ave. Newark, N. J.

Representing

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Tractors — Graders — Harvesters
American Tractor Equipment Co.
Killefer Manufacturing Co.
Willamette-Ersted Co.
Euclid Road Machy. Co.
LaPlant-Choate Co.

Howard-Cooper Corporation

Portland — Seattle — Spokane — Twin Falls

Representing

International Harvester Co. (McCormick-Deering Industrial Tractors)
Austin Machinery Corp.
Barber-Greene Co.
Cleveland Rock Drill Co.
The Osgood Co. (Shovels)
Hughes-Keenan Co.
Leach Co.
Nordberg Mfg. Co. (Symons Crushers)
Orton Crane & Shovel Co.
Rotary Snow Plow Co.
Schramm, Inc. (Compressors)
Universal Power Shovel Co.
Buda Co. (Diesel & Gas Engines)
Baker Mfg. Co.
Walter Motor Truck Co.
Seagrave Corp.
Pacific Goodrich Rubber Co.

Member: Associated Equipment Distributors

Ohio Valley Machinery Co.

Marietta Ohio

Representing

International Harvester Co.
Trackson Co.
Wehr Co.
Hughes-Keenan Co.
Schramm, Inc.
Bay City Shovels, Inc.
W. M. Blair Mfg. Co.
Brookville Locomotive Co.
Muskogee Iron Works
Corley Mfg. Co.
Detroit Harvester Co.
Domestic Engine & Pump Co.
Chain Belt Co.

BUNTING TRACTOR COMPANY

LA GRANDE, OREGON

Representing

Caterpillar Tractor Company
"Caterpillar" Tractors
"Caterpillar" Combines
"Caterpillar" Road Machinery
Athey Truss Wheel Company
LaPlant-Choate Mfg. Company
American Tractor Equipment Co.
Killefer Manufacturing Company
Willamette-Ersted Company
Williamsport Wire Rope Company

MITCHELL, LEWIS & STAVER CO.

330 E. Morrison St. Portland, Ore.

Representing

ANTHONY CO.—Hydraulic Dump Bodies
SOLANO IRON WORKS—"Pacific" Revolving Tractor Scrapers, Fresno Scrapers
THE NEW WAY MOTOR CO.—Air-Cooled Engines
STOVER MFG. & ENGINE CO.—Gasoline Engines
THE F. E. MYERS & BROTHER CO.—Power Pumps

J. WALKER WILSON

Contractors' Machinery

P. O. Box 33
YOUNGSTOWN OHIO

Representing

KEYSTONE DRILLER CO.
E. J. McHARG & CO.
SULLIVAN MACHINERY CO.
THE BARNES MFG. CO.
Keystone Excavators
MultiFoote Road Pavers
Sullivan Portable Compressors and Tools
Barnes Pumps
Blaw-Knox Buckets, Forms, etc.

Telephone 3-5766

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CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Ave. New York

Western Road Machinery Co.

220-222 E. Water St. Portland, Ore.

Representing

SMITH ENGINEERING WORKS—Telsmith Crushers
MADSEN IRON WORKS—Portable Asphalt Paving Plants
WORTHINGTON PUMP & MACHINERY CORP.—Worthington Compressors, Worthington-Gillman Air Tools
OHIO POWER SHOVEL CO.—LIMA 1 & 1¼ yd. Shovel
HUBER MFG. CO.—Road Rollers
J. D. ADAMS CO.—Adjustable Leaning Wheel Graders
HIGHWAY—Heavy-Duty Machinery Trailers
MUNICIPAL SUPPLY CO.—Oil Distributors
GENERAL EXCAVATOR CO.—General Half Yard Shovel
NOVO ENGINE CO.—Engines, Hoists and Pumps

Member: Associated Equipment Distributors

THE BOARDMAN CO.

Oklahoma City Oklahoma

Representing

ALLIS-CHALMERS MFG. CO.
Crawler and Wheel Type Tractors with Allied Equipment

ARMCO CULVERT MFRS. ASSN.
Armco Ingot Iron Culverts

KILLEFER MFG. CORP.
Dirt Moving Tools

BALZER MACHINERY COMPANY

314 East Sixth St. Portland, Ore.

Representing

Ohio Locomotive Crane Co.—Locomotive Cranes
Gardner-Denver Co.—Air Compressors, Drills, etc.
Byers Machine Co.—Small Power Shovels
Niagara Concrete Mixer Co.—Vibrating Screens
Superior Engine Co.—Diesel Engines
S. D. LeClair Co.—Dragline Buckets
Chicago Automatic Conveyor Co.—Conveyors, Loaders, etc.
J. S. Mundy Hoisting Engine Co.—Steam, Gas and Electric Hoists
Ohio Tractor Dump Wagons

GASH-STULL CO.

Chester Pennsylvania

Representing

Fordson Tractors
Universal Power Shovels
Michigan Power Shovels
Osgood Shovels
Road Machinery
Contractors Supplies
Diamond Tires
Oils—Greases

"Equipment & Supplies for the Fordson"

LOOK THIS DIRECTORY OVER CAREFULLY

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CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Avenue New York

CLYDE EQUIPMENT CO.

Contractors' Equipment and Supplies

Portland, Oregon Seattle, Wash.

Atlas Imperial Diesel Eng. Co.
Clyde Iron Works
Homelite Corp.
Jaeger Machine Co.
Lincoln Electric Co.
Bucyrus-Erie Co.
Geo. Halss Mfg. Co., Inc.
Sauerman Brothers
Lakewood Engineering Co.
Sterling Wheelbarrow Co.
Sullivan Machinery Co.
Traylor Engr. & Mfg. Co.
McKiernan-Terry Corp.
Klauer Mfg. Co.
Foote Company, Inc.
Allis-Chalmers Mfg. Co.
Le Roi Co.
Iowa Mfg. Co.
Bushe Bros.

Member: Associated Equipment Distributors

BARNARD TRACTOR & EQUIPMENT CO., INC.

825 Paxton Street, Harrisburg, Pa.

Representing

BAKER—Maneys and Drags
RUSSELL—Drags, Scoops
DOMESTIC—Pumps
HIGHWAY—Trailers
MIAMI—Trailers, Scrapers
W-K-M—Pipe Handling Equipment
DETROIT—Road and Street Brushes
WILLIAMS—Clam Shell Buckets
MILBURN—Carbide Lights, Paint Spray Outfits

BOWEN MACHINERY CO.

Excavating—Construction—Industrial EQUIPMENT

1126 N. Delaware Ave. Philadelphia, Pa.

Distributors for

BYERS Shovels and Cranes
McKIERNAN-TERRY Pile Hammers and Derricks
LAMBERT-NATIONAL Hoists, Car Pullers, Cableways
DAVEY Air Cooled Compressors
WILLIAMS Clamshell Buckets, Heavy Duty Trailers
TAYLOR-WHARTON Manganese Shovel and Bucket Teeth

MAERKY MACHINE WORKS

632 Race Street

Philadelphia Penna.

Representing

The Climax Engineering Co.

Twin Disc Clutch Co.

Modern Equipment Co.

ALLEGHENY EQUIPMENT CORP.

1218 Grant Bldg. Pittsburgh, Pa.

Distributors for

ALLIS-CHALMERS Tractors and Allied Tractor Equipment
"BERG" Highway Surfacers
GARDNER-DENVER Compressors and Drills
HERCULES Road Rollers
JACKSON Concrete Placement Vibrators
MICHIGAN ⅜-Yd. Shovels
NORTHWEST Power Shovels and Cranes
REX Moto-Mixers, Building Mixers, Pavers and Pumps

DE HUFF AND HOPKINS

261 N. Broad Street Philadelphia

Representing

SPEEDER MACHINE CORPORATION
¼ yd., ½ yd. and 1¼ yd. full revolving Shovels & Cranes
Motor Truck Cranes
EASTON CAR CONSTRUCTION CO.
Dump and Flat Cars for Construction Work
Concrete Handling Dump Bodies
Turntables—Portable—Track—Rails, etc.
BROOKVILLE LOCOMOTIVE CO.
Ford and McCormick-Deering Type Gasoline Locomotives
MILWAUKEE LOCOMOTIVE MFG. CO.
Gasoline Locomotives, 4 to 30 tons
O. K. CLUTCH & MACHY. CO.
Air Compressors & Hoisting Machinery

Portable Belt Conveyors — Valves and Sluice Gates—Steel Plate Work

HOWARD W. READ CORP.

800 N. Delaware Ave., Philadelphia, Pa.

Distributors

DOMESTIC ENGINE & PUMP CO.—Pumps
HAISS—Buckets
JONES SUPERIOR—Saw Rigs
LINK-BELT—Cranes and Shovels
MEAD-MORRISON—Cranes & Shovels
PENNA. BOILER WORKS—Boilers
AUSTIN-WESTERN ROAD MACHINERY CO.—Rollers, Graders, etc.

Additional Equipment in Stock:

McKIERNAN-TERRY—Hammers
INGERSOLL-RAND—Compressors
UNIVERSAL—Truck Cranes

C. H. ARNOLD COMPANY, Inc.

Road and Street Machinery Contractors' Equipment

726-730 Park Bldg. Pittsburgh, Penna.

Representing

THE FOOTE COMPANY....Multifoote Paving Mixer
BLAW-KNOX COMPANY...Road and Sidewalk Forms, Bins, ORD Concrete Road Finishing Machines
SULLIVAN MACHY. CO.....Compressors and Tools
LITTLEFORD BROS.....Tar and Asphalt Heating Equipment
GENERAL EXCAVATOR CO.Gas Shovels, Cranes and Draglines
BARNES MFG. CO.....Force Feed and Diaphragm Type Pumps
J. D. ADAMS CO.....Earth Moving Equipment

EDELEN & BOYER COMPANY

Office and Warehouse Philadelphia
236 N. 23rd St. Penna.

Distributors for

Lima "101" Shovel, Crane & Trencher
General Shovels, Cranes, Skimmer, Back Hoe
Multi Foote Pavers
Flory Hoists
Freeman Turntables
Heltzel Steel Road Forms
Heltzel Sidewalk & Gutter Forms, Bins and Batchers
Saugen Derricks & Elevators
Wonder Mixers and Pumps
Miles Block Machines
Pulsometer Steam Pumps
CMC Gasoline Hoists
Olmstead Platform Trailers
Hayward Clamshell Buckets
Archer Concrete Towers and Chuting Plants
Marsh-Capron Mixers
Mario Mud and Water Pumps
Bay City Truck Cranes
Haiss Loaders, Unloaders and Belt Conveyors
Tru-Lay Steel Cable
Reynolds Constr. Furnaces
Jackson—Wheelbarrows, etc.

REEVES-McCORMICK, Inc.

5317 No. 2nd St. Philadelphia, Pa.

Representing

FORDSON—Tractors, all accessories
WEHR—Graders and rollers
TRACKSON — McCormick-Deering Crawlers, bulldozers and shovels
STERLING—Tractor cranes and tugs
NOVO—Engines, pumps and hoists
ERIE—Bins, buckets, aggremeters
CONNERY—Kettles, asphalt heaters
INDEPENDENT—"Thor" Air Compressors, tools

WE WOULD LIKE TO HAVE YOU HELP US

make this Directory of Dealers in construction equipment the most complete and accurate of its kind. Therefore, we would greatly appreciate any suggestions or corrections that you may have to offer.

CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Ave. New York

HARRY J. FERGUSON

Complete Labor-Saving Material-Handling Equipment

626 Race Street, Philadelphia, Pa.

Representing

SPROUT, WALDRON & CO., INC.—Material-handling Equip., Elevating & Conveying Machy., Bulk Cement Handling Equip.
W. A. JONES FOUNDRY & MACHINE CO.—Spur-Herringbone and Worm Speed Reducer
MOLINE MALLEABLE IRON CO.—Malleable Iron Chain and Sprockets
CHICAGO AUTOMATIC CONVEYOR CO.—Portable Loaders, Unloaders, Portable Belt Conveyors

SERVICE SUPPLY CORPORATION

20th and Venango Sts.
PHILADELPHIA, PA.

Chain Belt Co.—Rex Pavers, Mixers, Truck Mixers
Owen Bucket Co.—Clamshell Buckets
Lidgerwood Mfg. Co.—Hoists, Winches, Cableways
Dravo Equipment Co.—American Tubular Towers
Hercules Co.—Road Rollers **Union**—Pile Hammers
International Harvester Co.—Industrial Tractors
Allis-Chalmers—Monarch Tractors
Bay City Shovels, Inc.—Shovels, Cranes and Cranemobiles
W. A. Riddell Co.—Graders, Scrapers & Tracks for Tractors
Butler Bin Co.—Bins, all sizes
Chicago Pneumatic Tool Co.—Air Compressors and Tools
Littleford Bros.—Asphalt and Tool Heaters
Member: Associated Equipment Distributors

A. H. KRIGGER & COMPANY

4 E. Carson St. Pittsburgh, Pa.

Representing

HERCULES Gasoline Engines & Parts
REED-PRENTICE Sawing Machines
HUMDINGER Pumps
STOVER Engines
CLIMAX Engine Parts
GROUNDHOG Tractor Scrapers
UNIVERSAL Gas Electric Units
HARDIE Sprayers
JACOBSEN Power Mowers
PLANT Mule Tractors
LE ROI Engines and Parts
DETROIT HARVESTER Tractor Mowers
HARDIE High Pressure Pumps
Rock Crushers and Coal Crushers
Steam Cleaning Jenny

Gasoline Locomotive Parts

Industrial and Farm Gasoline Engines

GILES & RANSOME

17th St. & Sedgley Ave., Philadelphia

RANSOME CONCRETE MACHINERY CO.—Concrete Mixers and Appliances
BLAW-KNOX CO.—Clam-shell Buckets, Steel Forms, Steel Buildings, Steel Bins
CATERPILLAR TRACTOR CO.—Tractors and Road Machinery
RICHMOND SCREW ANCHOR CO.—Concrete Specialties
THE BARNES MFG. CO.—Centrifugal Diaphragm and Force Pumps
NORTHWEST ENGINEERING CO.—Gasoline Cranes and Shovels
ORD—Road Finishing Machine
CLYDE—Hoisting Engines and Derricks
GARDNER-DENVER—Compressors and Tools
TOLEDO WHEELBARROW CO.—Wheelbarrows
Member: Associated Equipment Distributors

J. JACOB SHANNON & CO.

1744 — Market Street — 1744
PHILADELPHIA

Representing

Jaeger Concrete Mixers
Lakewood Road Equipment
Mundy Hoisting Engines
American-Gopher Crawler Cranes
Red Star Shores & Column Clamps
Saugen Derricks & Winches
Berg Concrete Surfacers
Williams Trailers
Jaeger Pumps
Bates Wire Ties & Tying Tools
Wyoming "Red Edge" Shovels
Jaeger Truck Mixers
Lakewood Material Towers
Terry Steel Derricks
American Revolver Derricks
Red Star Barrows & Carts
Berg Hi-Way Surfacers
Williams Clam Shell Buckets
Jaeger Hoists
Multiplex Electric Saws
Universal Concrete Accessories
Roebling Wire Rope

MARTIN J. O'BRIEN CO., INC.

512 Columbia Bldg.

Pittsburgh, Penna.

Nordberg-Butler Underground Shovels
Standard Gage Track Shifters Narrow Gage
Nordberg Railway Track Equipment
Bay City Tractor Shovels and Cranemobiles
Bay City Full Revolving Shovels up to 1½ yard
Whitcomb Locomotives, Gas, Electric, Diesel
The Patterson Gyro-centric Crusher

W. J. DOORLEY

Scottdale **Penna.**

Representing

Asphalt Equipment Co.
Good Roads Equipment Corp.

"All kinds of Asphalt Equipment"

ENSMINGER AND COMPANY

75-77 Hazle Street **Wilkes-Barre, Pa.**

Representing

JAEGER Concrete Mixers, Towers, Pumps
LINK-BELT Shovels, Cranes, Backfillers
BAY CITY Tractor Shovels
SCHRAMM, INC., Air Compressors
SOUTH BEND Lathes
MUNDY Hoisting Equipment
BLAW KNOX Buckets
DOBBIE Derricks and Winches
NEW HOLLAND Rock Crushers
HIGHWAY SERVICE Chip Spreaders
JACKSON Wheelbarrows and Concrete Carts
AMERICAN Saw Mill Machinery
ADAMS, Graders
REED-PRENTICE Timber Saws
CLEVELAND Rock Drills, Air Tools
SHUNK MFG. CO.—Tractor Dump Wagons
HOTCHKISS Road Forms

POWELL-DAVIES TRACTOR AND EQUIPMENT COMPANY, INC.

152 Horton St. **Wilkes-Barre, Pa.**

Representing

"CATERPILLAR" Tractors and Road Machinery
LaPLANT-CHOATE Wagons, Bulldozers and Snow Plows
ATHEY TRUSS WHEEL Trailers
EUCLID Wagons and Bulldozers
BAKER-MANEY Wheel and Roll-Over Scrapers
WILLAMETTE-ERSTED Tractor Hoists and Logging Equipment
DAY Crushers
DAVEY Air Compressors
W-K-M Pipe Handling Equipment
KILLEFER Road and Agricultural Tools
UNIT Shovels
DOMESTIC Pumps

CAROLINA CONTRACTORS EQUIPMENT & SUPPLY COMPANY

P. O. Box 576 **Columbia, S. C.**

Representing

J. D. Adams Co.
Allis-Chalmers Mfg. Co.
Koehring Co.
Insley Mfg. Co.
E. D. Etnyre Co.
C. H. & E. Mfg. Co.
Sullivan Machy. Co.
Heltzel Steel Form & Iron Co.
T. L. Smith Co.
The Parsons Co.
Owen Bucket Co.
Stelle "Junior" Stone Spreaders
Red Star Wheelbarrows
St.Paul Hydraulic Hoist Co.
Monarch Road Machy. Co.
Metal Lubricant Co.
McKiernan-Terry Corp.
The Geo. Haiss Mfg. Co.
Baker Mfg. Co.
Fulton Bag & Cotton Mills
Happ Bros.
Erie Road Rollers

GIBBES MACHINERY COMPANY

Columbia **South Carolina**

Representing

CLEVELAND TRACTOR CO.—Tractors
AMERICAN SAW MILL MACHINERY CO.—Woodworking Machinery and Equipment
BAY CITY SHOVELS, INC.—Shovels, Cranes, Draglines and Tractor Shovels
UNION STEAM PUMP CO.—Compressors and Pumps
SKELTON SHOVEL CO.—Shovels and Scoops
TOLEDO PRESSED STEEL CO.—"Toledo" Torches
COLUMBUS IRON WKS. CO.—Grader Blades
MARION STEAM SHOVEL CO.—Shovels, Gas, Electric, Diesel or Steam
DOMESTIC PUMP CO.—Pumps, Road, etc.
ATLAS SCRAPER CO.—Rotary Wheel Scrapers
WELLMAN ENGINEERING CO.—Buckets, Heavy-Duty Trailers

Also

Road Graders and Rollers, Boilers, Steam and Gasoline Engines

JEFF HUNT ROAD MACHINERY CO.

Columbia **So. Carolina**

Representing

"CATERPILLAR" Tractors
"CATERPILLAR" Road Machinery
REX Mixers, Pavers, Pumps
EUCLID Scrapers & Wagons
KILLEFER Farm Machinery
Road Tools
BURCH Loaders & Conveyors
ORD Finishing Machine Buckets
BLAW-KNOX Road Forms, Bins
"RED EDGE" Shovels
HVASS Street & Road Equipment
PIONEER Gravel Equipment
AUSTIN Trench Machines
CLYDE Hoists and Derricks
LaPLANT-CHOATE Dump Wagons
ATHEY Trailers
HERCULES Red Strand Cable
WIARD Plows, Roadrippers, Scrapers
WILLAMETTE-ERSTED Hoists
P & H Shovels, Cranes, etc.
ATECO—Scrapers
CLEVELAND Formgraders, Straight Edges, etc.

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CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Ave. **New York**

WESTERN MATERIAL CO.

Sioux Falls, S. Dak.

BARNES Pumps
BLACKHAWK Jacks
BLAW-KNOX CO.
BURCH Stone Spreaders
CLEAVER Tank Car Heaters
CLYDE Hoists
CONSTRUCTION MACHINERY CO.
DETROIT Mowers
HERCULES Motors
HUBER Road Rollers
INDIANA Trucks
LENHART Wagons
LINK-BELT Shovels
LITTLEFORD BROS.
McCLOSKEY Torches
M & M Form Devices
MADSEN Pre-Mixing Plants
NOVO Engines
PAGE Buckets
PHILIP CAREY CO.
PIONEER Gravel Equipment
PORTABLE MACHY. CO.
QUAKER State Lubricant
ROTARY Snow Plows
ROSCO Oil Distributors
RUSSELL Plows & Scrapers
SASGEN Derricks
SOLVAY Calcium Chloride
STERLING Wheelbarrows
VULCAN Pile Hammers
SCHRAMM, INC. Air Comp.
WOOD "Molly" Shovels
WAUSAU Snow Plows
YELLOWSTRAND Cable

Member: Associated Equipment Distributors

NIXON-HASSELLE CO.

Contractors' Equipment

CHATTANOOGA **TENNESSEE**

Representing

BLAW-KNOX Buckets and Forms
DOBBIE Derricks
HANSON Excavators & Cranes
MUNDY, Hoists
DeWALT Woodworking Equip.
EASTON Dump Bodies, Cars and Track
BARBER-GREENE Loaders and Conveyors
INGERSOLL-RAND Compressors
REX Mixers, Pavers and Pumps
NORTHWEST Cranes and Shovels
ARCHER Tower and Spouting Equipment
VULCAN Gasoline Locomotives
McCORMICK-DEERING Tractors
WARCO Graders
TRACKSON Tracks, Cranes, etc.
NEWPORT Culvert Pipe
Also Wheelbarrows—Carts—Benders—Cutters—Shovels—etc.

Member: Associated Equipment Distributors

CHOCTAW CULVERT AND MACHINERY COMPANY

Second & Butler Sts. **Memphis, Tenn.**

Representing

Jaeger Machine Co.
Sterling Wheelbarrow Co.
Littleford Brothers
Buffalo-Springfield Roller Co.
Lakewood Engineering Co.
The Foote Co.
Owen Bucket Co.
Butler Bin Co.
Beach Mfg. Co.
Northwest Engr'g. Co.
Smith Engineering Works
Clyde Iron Works
Sasgen Derrick Co.
Gardner-Denver Co.
E. D. Etnyre Co.
Drake-Williams-Mount Co.
Le Roi Company
Trackson Company
Beebe Bros.

Member: Associated Equipment Distributors

NASHVILLE TRACTOR & EQUIPMENT CO.

322 Fifth Ave., S. **Nashville, Tenn.**

Representing

CATERPILLAR Tractors and Road Machinery
EUCLID Wagons & Scrapers
GARDNER-DENVER Air Compressors and Tools
SPEEDER Shovels & Cranes
LA PLANT-CHOATE Bulldozers, Wagons & Scrapers
IOWA MFG. COMPANY Crushers, Plants, Mixing Plants
KILLEFER Scrapers
GENERAL Wheelbarrows, Scrapers and Blades
HAISS Loaders & Conveyors
WILLIAMS Buckets and Trailers
ATHEY TRUSS WHEEL Wagons
DOMESTIC Pumps & Hoists
TOLEDO Torches
BURTON Explosives
CARTER "Humdinger" Pumps

Wilson-Weesner-Wilkinson Co.

Nashville **Tennessee**

NATIONAL EQUIPMENT CO.

Koehring Co.
Insley Mfg. Co.
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
C. H. & E. Mfg. Co.
Clyde Iron Works
Good Roads Machy. Co.
The Parsons Co.
T. L. Smith Co.
Ingersoll-Rand Co.
Littleford Bros.
McKiernan-Terry Corp.
Western Wheeled Scraper Co.
Wyoming Shovel Works

Warehouse Stocks of Service

NASHVILLE — KNOXVILLE MEMPHIS

Member: Associated Equipment Distributors

BROWNING-FERRIS MACHY. CO.

205 Exposition Ave. **Dallas, Texas**

Houston—Austin—San Antonio

Representing

Buffalo-Springfield Roller Co. (*Dallas & Amarillo*)
Barber-Greene Co. (*Dallas & Amarillo*)
Lakewood Engineering Co.
Sterling Wheelbarrow Co.
Jaeger Machine Company
Heltzel Steel Form & Iron Co.
Ingersoll-Rand Co.
Foote Co.—Pavers
Homelite Corp.—Pumps
Littleford Bros.
Universal Crushers
Thew Shovel Co.
Trackson Co. Crawlers, Hoists
McCormick-Deering Tractors
Cleveland Crawler Tractors

CLARK & BURROWS, Inc.

3915 Main Street **Dallas, Texas**

Representing

KOEHRING—Pavers, Mixers, Power Shovels, Cranes, Draglines, Dumptors
INSLEY—Excavators, Concrete Placing Equipment, Cars, Buckets, Derricks, Shoulder Finisher
T. L. SMITH—Tilting and Non-Tilting Mixers, Pavers
PARSONS—Trench Excavators, Backfillers, Trailers
C. H. & E.—Portable Saw Rigs, Pumps, Hoists
KWIK-MIX—Mixers; Concrete, Plaster and Mortar
C. S. JOHNSON—Material Storage Bins and Batchers
HERCULES—Rollers, Crawl Tractor Roller
METAL FORMS CORP.—"Metaforms"
CONSOLIDATED IRON-STEEL MFG. CO.—Cleveland Road Torch
WORTHINGTON—Portable Compressors and Air Tools

A Complete Line of Construction Equipment

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CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Avenue New York

F. W. GARTNER COMPANY

1010 Milby Street — Houston, Texas

Contractors Equipment

RANSOME Mixers & Pavers
JOHNSON Bins, Batchers
BARNES Pumps
HAISS Loaders, Conveyors
KOPPEL Cars
MUNDY Hoists Equipment
BLYSTONE Mixers
SCHRAMM Compressors
SASGEN Concrete Equip.
BAY CITY Cranes, Shovels
PARSONS Trenchers, Backfillers
CLEVELAND Air Tools
PAGE Dragline Buckets
HAYWOOD Clamshell Buckets
ACME Road Rollers, Graders
ACME Crushers
CLIMAX Gasoline Engines
LE ROI Gasoline Engines
ROGERS Trailers
DOBBIE Derricks
MACLEOD Kettles
BAY CITY Truck Cranes

PHILLIPS MACHINERY CO.

900 East Cary St. — Richmond, Va.

Representing

RANSOME CONCRETE MACHINERY CO.
CLYDE SALES CO.
DeWALT PRODUCTS CORP.
ERIE STEEL CONSTRUCTION CO.
SAUERMAN BROTHERS, INC.
CHICAGO PNEUMATIC TOOL CO.
STEPHENS-ADAMSON MFG. CO.
METAFORMS CORPORATION
ROGERS BROTHERS CORP.
GENERAL EXCAVATOR CO.
AEROIL BURNER CO.
BARNES MANUFACTURING CO.
MANITOWOC ENGINEERING WORKS
BRODERICK & BASCOM ROPE CO.
ARCHER IRON WORKS

Also many other lines of Contractors' Equipment

PACIFIC HOIST & DERRICK CO.

Machinery and Equipment

3200 4th So. — Seattle, Wash.

Representing

NORTHWEST — Gas and Electric Shovels, Cranes and Draglines
BUHL—Air Compressors
TWIN DISC—Clutches for all purposes
PAGE—Scraper Buckets, Diesel Draglines
MINNEAPOLIS—"Twin City" Gas Engines
CLIMAX—Gasoline Engines
WISCONSIN—Gasoline Engines
MIDWEST—Locomotives
DAKE ENGINE CO.
PIONEER—Gravel Equipment
ISAACSON IRON WORKS—Buckets

Members Associated Equipment Distributors

ALAMO IRON WORKS

130 Santa Clara St., San Antonio, Tex.

Koehring Shovels, Cranes
Insley Shovels, Cranes
Koehring Pavers, Mixers
Smith Pavers, Mixers
Parsons Ditchers, Backfillers
Koehring Dumptors
Telsmith Crushers, Screens
Schramm Portable Compressors
Gardner Stationary Compressors
Orr and Sembower Hoists
C. H. & E. Saw Rigs
H & A Woodworking Machinery
Sidney Woodworking Machinery
Haiss Loaders and Conveyors
Butler Bins
Williams Buckets and Heavy Duty Trailers
Red Star Barrows
Molly Shovels
Evinrude Pumps
Waugh Rock Drills
Black & Decker Electric Hammers
Black & Decker Electric Saws
Williamsport Wire Rope

JOS. S. POTTS, JR. COMPANY

Factory Sales Engineers

Travelers Bldg. — Richmond, Va.

Representing

Bucyrus-Erie Co.
McKiernan-Terry Corp.
Deister Concentrator Co.
National Wire Cloth Co.
Williams Buckets and Trailers
Boston Woven Hose & Rubber Co.
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